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Battelle Technical Review

VOLUME 1, NUMBER 5

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GILLETT MEMORIAL LECTURER

NORMAN L. MOCHEL

"What is great must serve, and Horace Gillett served so well that he was a real servant of the metallurgical profession." With these words, Norman L. Mochel, who is to present the first H. W. Gillett Memorial Lecture, before the annual meeting of the American Society for Testing Materials, gives his impression of the man he is to honor. Dr. Gillett was one of America's outstanding metallurgists and also the first director of Battelle. It is fitting, therefore that Battelle should join with the American Society for Testing Materials in establishing an annual lecture to honor both the man and his work.

"Gil," as his friends knew him, was a preeminent industrial scientist. Because his first love was research, he relinquished the directorship of Battelle, in 1934, to become its chief technical advisor. In this position he continued what had always been characteristic of him—readiness to help others. His door was open to all who needed information or suggestions on their work. In a broader way, his writings served all his fellow scientists and technologists.

Norman Mochel was a natural choice as the first Gillette Lecturer at ASTM's annual meeting this year. Like Gil, he understands the importance of service, and he is an outstanding metals scientist. As manager of metallurgical engineering at Westinghouse Electric Corporation, he has contributed mightily to the advances of his own company and the great heavy power industry that it serves. He has been chairman of ASTM's Committee A-1 on steel for 14 years and has served on the ASTM-ASME Joint Committee on the Effect of Temperature on Metals since 1928—ten years as chairman. He also is a member of ASTM's Non-Ferrous Committee. Mr. Mochel has had a hand in the development of the jet engine, work on power apparatus for the United States Navy, and construction of the 200-inch telescope on Mt. Palomar. As consultant, he has an important role in the atomic developments being carried on at Westinghouse.

Lecturer Mochel points out that Horace Gillett symbolized the research industry—a statement that describes Mochel as well. That industry's great accomplishments have been possible only because of the ability, cooperation, and teamwork of its workers, qualities possessed both by Gil and the lecturer who honors him.

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Service, Profit, and Research

Andre J. Teisseire, in a guest editorial published in the May, 1952, *Rotarian*, tells about a French writer who had visited the United States. This writer reported that he observed nearly everywhere in America a certain zeal among workers that could not be explained by the simple fact of good pay. He attributed this zeal to a "taste for service"—a desire among Americans to be useful, to better in a practical way the lot of all. He concluded that the economic masses of the United States receive an education inspiring in the two ideas of "service" and "profit."

No doubt much of the misunderstanding peoples of other countries have about America lies in our failure to get across to them our concepts of profit and service. To many people, "service" means to be servile. To Americans, it means to do a good work — one useful to mankind.

"Profit" to the masses of some countries has a parasitical connotation. "Profit" to Americans is the result of having contributed a service. A banker or a tradesman makes a profit when the earned reward for his services is greater than the expenses of doing business. When a banker makes a profit, he may use it as "capital" to expand his operation and serve more people. When a tradesman makes a profit, he may use it as capital to purchase power tools and thus serve more people. If the banker and the tradesman choose to use their profits as capital, they stand to make still larger profits because they will be contributing larger services. However, it is the prerogative of each to spend his profit on noncapital goods if he desires.

Research is aligned closely with service and profits. Research results from the wish of a company to provide greater services to its customers. Research is financed by profits and, without profits, research, as we know it, could not exist. Research is also capital — something used to produce more services and thus, incidentally, more profits.

People working in industrial research are close to the heart of the U. S. free enterprise system. It is not difficult for them to understand the observation of the French writer. They see big corporations as well as individuals striving to serve. They know that the profits companies receive are expressions of public approval for services rendered. Research people understand the essential morality of free enterprise.

Research enters into our economic complex in still another way. Just as research is dependent upon free enterprise for existence, so is our enterprise system dependent upon research. In the past, exploitation of natural resources kept our economy functioning vigorously. Today, there are few new natural resources to be found and developed. There is, however, the unlimited resource of scientific research.

Research will keep our economic system functioning indefinitely — keep men working with a zeal that cannot be attributed to good pay alone.

Clyde Williams

Director, Battelle Memorial Institute

Materials for Tailor-Made Coatings

by B. G. BRAND

The author entered the laboratories of the Pigments Division of the E. I. du Pont de Nemours and Company after receiving his Master's degree at West Virginia University. At Du Pont, he specialized in research and development of white pigments. He became associated with Battelle in 1946, where he has been engaged in general coatings research, giving special attention to the formulation and evaluation of paints and enamels.

SINCE earliest times, man has sought to make his surroundings more pleasant through the use of painted, decorative designs. The cave man started things by drawing and painting crude pictures to brighten up his cave home. From these primitive beginnings, the use of decorative coatings can be traced down through the ages.

As time went on, uses other than decorative were found for coatings. Man found that paints often outlasted many of the objects he used. He discovered that a painted copper sword was less likely to corrode than an uncoated one, and wooden objects did not deteriorate so rapidly when covered with paint. Gradually, artisans developed special coatings for specific uses.

Through all this development, the process of making and applying a coating remained largely an art. It was not until within the last twenty-five to thirty years that science began to play a part in the development of better coatings for more widespread use. Even today, art plays an important part in obtaining the best results from a given material.

The usual organic coating consists of three basic components. These are: (1) the pigment, which gives color and opacity to the coating; (2) the vehicle, which holds the pigment particles together and in place on the object being coated; and (3) the solvent, which controls the viscosity or body of the coating. Various other ingredients are frequently added to coatings to perform certain specific functions. These so-called "additives" will be discussed at greater length later in this article.

Let us examine these basic components in order, in somewhat greater detail.

Pigments

The need for color and opacity in a material appears mainly in the purely decorative coatings. When designed as a protective coating, the pigment frequently has additional duties to perform. It has been found that certain pigments, such as zinc chromate, barium chromate, iron oxide and lead oxide, tend to inhibit or slow down corrosive attack on the metal under the coating containing them. Pigments, such as these, are therefore frequently used in primers applied directly to the metal that is to be protected against corrosion.

Many beautifully colored organic, inorganic, and organo-metallic compounds are used to produce colors of every hue and shade known to man. Colors from dead white through a wide variety of pale pastel shades and dark, sombre colors, to midnight black, are possible through the proper choice of present pigment materials. The colors so produced are completely reproducible. They may be prepared over and over again, by modern techniques, to end always with exactly the same shade.

By varying the amount of pigment material in the coating, it is possible to control the appearance from a high-gloss enamel, through a semigloss or eggshell, to a flat, lusterless finish. As more pigment is incorporated into the coating, more and more particles protrude through the surface of the coating to impart a surface roughness that scatters the light as it is reflected from the surface. This destroys the mirror-like reflection of the vehicle, and gives a flat appearance.

In cases where the natural appearance of the material to be coated is to be retained, no pigments whatsoever are added to the coating, and the clear vehicle alone is used to protect the beauty of the object.

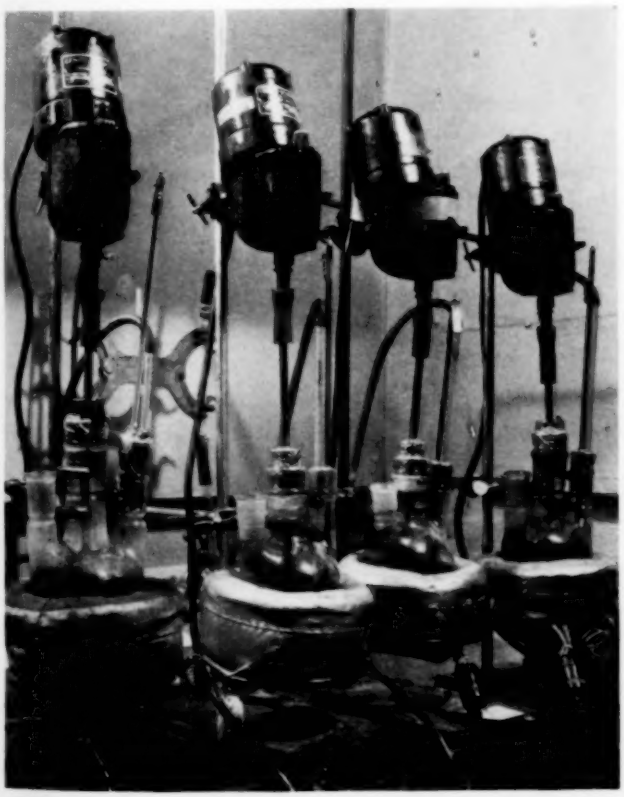
Certain pigments are chosen for a particular effect. Flake aluminum, when incorporated in the proper vehicle and solvent combination, tends to orient itself, or "leaf." If we were to examine a leafed aluminum coating in cross section, it would have somewhat the same appearance as a brick wall. The flakes of aluminum would be overlapped, and the end result of such a system would be a greatly increased resistance to the passage of vapors and moisture through the film.

On the other hand, if appreciable amounts of a

very porous or finely divided material such as diatomaceous earth were added to a coating, more vehicle would be adsorbed on the pigment surface, and the resulting film would be very porous. The present trend in designing outside house paints is in this direction. The designers claim that such a paint can "breathe," and permits the escape of moisture vapor from beneath the film, thus resulting in reduced peeling of the paint from the wood substrate.

Extenders

One additional material is usually incorporated in a coating and is usually considered as a part of the pigment portion. This material is called an "extender." Many of the highly colored pigment materials are very expensive, and if used as the sole pigment, would make the cost of the coating prohibitive. Consequently, extenders can be added to increase the bulk of the pigment without appreciably detracting from its tinting or coloring ability. If used by themselves, extenders would not make suitable pigments. But used in conjunction with true pigments, they extend, or stretch, the pigments and permit them to do a much more efficient job. This mechanism can be pictured as small pigment particles surrounding a core of extender material, thus effectively increasing the bulk of the pigment material. Extenders are usually very low-cost materials, such as calcium or barium sulfate, chalk, clay, talc, ground mica, and diatomaceous earth.



With these alkyd-resin kettles, researchers can duplicate many industrial processes in the laboratory. The electrical heating mantles in which the retorts are nested, allow the "cooking" of coatings at various temperatures. The rubber tubing is used to bubble inert gases through the "cooks" in order to keep out oxygen which might darken, or even jell, them.

Vehicles

The greatest control over the characteristics of a coating is in the choice of the vehicle, or resin that is used to bond the pigment particles together and hold them in place. It can readily be seen that if a water-soluble binder were used in making a coating, not very much weather resistance would result. The coating would probably be completely washed away in the first rain storm. Similarly, if we are to design a coating to be used in an alkaline atmosphere, the first requisite of the binder must be alkali resistance of a high order. Pigments and extenders are usually relatively inert to most of the elements of exposure, and the greatest susceptibility to attack is with the binder or vehicle.

The earliest coatings were produced by using egg whites or albumen from milk as the binder. With the discovery of drying oils such as linseed and tung oils, a great improvement in the quality of coatings was possible. Today, a variety of synthetic materials is available, each having its own characteristics, and each having its own applications, dependent upon those characteristics.

Vehicle materials may be classified broadly into three categories: (1) resins that dry by solvent evaporation only; (2) resins that dry by chemical reaction with oxygen from the air; and (3) thermosetting resins, which dry under the influence of heat.

Resins that dry by solvent evaporation alone are popularly known as "lacquer" resins. These materials are usually dissolved in an organic liquid. On evaporation of the solvent, the material resumes its original resinous nature, and acts as the binder for the pigment particles. The main disadvantage of lacquers lies in their poor resistance to certain common solvents. This property can seldom, if ever, be changed. Lacquer resins are typified by nitrocellulose, the acrylic resins, the vinyl resins, and practically all the thermoplastic polymeric materials. They are used to make fast-drying coatings.

The resins that dry by chemical reaction with oxygen from the air consist largely of the drying oils and modifications of them. They absorb atmospheric oxygen, which enters into chemical reaction with the unsaturated components of the oil by a complicated

Checking corrosive liquid in a test cell. Samples of steel on which drum coatings have been applied are placed at each end of the glass cylinders of the cells. The effectiveness of each type of coating is determined by the time required for its penetration by the corrosive liquid.

mechanism not fully understood. The oils first become gelatinous, and finally solidify to a hard, tough, resinous material. Most of us are familiar with the drying of linseed oil. Tung or chinawood oil undergoes a similar but somewhat more rapid mechanism on drying by exposure to air.

The drying oils can be modified by dissolving hard resins in them at elevated temperatures. The resultant material, known as an oleoresinous varnish, dries somewhat faster and gives a tougher, more durable film than the oil alone.

If, instead of using a hard resin as the modifying agent, we add a dibasic acid or its anhydride, such as phthalic anhydride, and a polyfunctional alcohol, such as glycerol or pentaerythritol, and heat the mixture, all three components react. The resulting reaction product is known as an "alkyd" resin. It represents a marked improvement over the oleoresinous varnishes in durability. By altering the type and amount of oil we are able to make a large variety of products of widely different characteristics. It is possible, therefore, to obtain a high degree of control over the characteristics of our resinous material.

There is a wide variety of thermosetting resins being produced today. They are mostly polymeric materials that undergo further polymerization under the influence of heat and consequently become insoluble and infusible. Generally speaking, they represent the most durable, resistant resins now available for coatings. They are used either alone, or in conjunction with other resins, to obtain some definite characteristic. The phenol-formaldehyde, urea-formaldehyde, melamine-formaldehyde, and epichlorhydrin-bis-phenol condensate resins fall in this group.

Another distinct group of vehicles that is becoming more and more popular today is the emulsion binders. They are difficult to classify under the above groups, but probably fit more closely among those that dry by solvent evaporation alone. The emulsion vehicles are colloidal suspensions of very small particles of an insoluble resin in a liquid medium which is usually water. On evaporation of the water, the colloidal particles unite and form a continuous film of the resin. The preparation of paints from these materials requires special techniques, but the resulting coating is easily applied to give a durable film with many desirable properties. Many of the so-called "rubber-base" paints that can be thinned with water are made from latex resins.

Solvents

A complete discussion of solvents is beyond the scope of this article. However, the solvent is a very important component of any coating system. It controls the body or viscosity of the coating, and determines the ease of application. It affects the rate of drying by its evaporation rate. It determines the thickness, as well as the character, of the film that is applied. Hence it can be seen to be a very important component of any coating material. The solvent is usually a mixture of volatile organic liquids, carefully blended to obtain the desired solvency, rate of evaporation, surface tension, viscosity, and application characteristics.

Additives

A very large number of "additives" may be used to give coatings particular characteristics. Probably the two most widely used additives are drying agents and anti-skinning agents. Drying agents are usually oil-soluble soaps of cobalt, manganese, lead, calcium, or zinc. These are apparently catalysts for the reaction of oxygen with drying oils, and are used to control the rate and type of drying that is obtained with drying-oil-containing resins. Anti-skinning agents are volatile antioxidants that prevent premature reaction of oxygen with the resins. However, when the

resin is in a thin film, the antioxidant evaporates and permits the drying of the film to proceed in a normal manner.

Such other additives as grinding aids, viscosity control agents, detergents, water repellants, fungicides, germicides, and odor-control agents are frequently added to coatings for obvious reasons.

With all the specialization that has been found necessary in present-day protection against corrosion, it appears more and more evident that the day of the tailor-made coating for specific applications is already upon us.

Let us examine a specific example of the development of a specialty coating for a difficult job. The Steel Shipping Container Institute, an organization of the more prominent manufacturers of steel drums, engaged Battelle to develop an improved coating for use in lining steel shipping containers. The coating had to permit the shipping of industrial acid and alkaline solutions in steel, although they normally require glass or other highly resistant containers. A search of the commercially available coating materials showed that no one on the market at that time had all the required characteristics. Consequently, work was started in the laboratory to develop a coating that would have the desired qualities. An examination of available vehicles resulted in a choice of a blend of certain phenol-formaldehyde and Epon resins as the base material. This vehicle was then pigmented with an amount of titanium dioxide that gave the least permeability of corrosive materials through the film to attack the underlying metal. The solvents were carefully selected to give the best application properties and the type of film required for the purpose. Throughout the study, economic considerations were continually kept in mind.

After suitable testing for flexibility, adhesion, and film integrity, in addition to determining the resistance of the material to attack by the many things with which it could be expected to come in contact, the coating was finally pronounced satisfactory, and is currently being adapted to the production schedules of many drum plants.

This is only one example of the many highly specialized jobs protective coatings are being called on to do in the modern world.

The test rack shown below is used for determining the outdoor-exposure characteristics of coatings. These samples are being subjected to semi-tropical sun and high humidity.

Radioisotopes Add a New Dimension

by RALPH BELCHER

The author's experience in the field of nucleonics began at Oak Ridge, Tennessee, in 1944. He later was a research engineer at the Hanford, Washington, plutonium plant. A member of Sigma Xi, he joined the Battelle staff four years ago and now specializes in the fields of physical and radiochemistry.

PERHAPS no research tool in the history of modern science has had a greater effect on scientific investigation than radioisotopes. They have presented the engineer with another level of visibility through which he can "see" the atoms of an element "tagged" with a radioisotope as they are manipulated through complicated physical and chemical processes.

What are radioisotopes? They are atoms of elements that give off radiations that are detected by instruments such as the Geiger counter.

The radiation given off by radioisotopes provides a means of detection millions to billions times more sensitive than any other physical or chemical tool previously at man's disposal. With this tool, such divergent problems as the treatment of cancer and the measurement of the height of molten metals in cupolas have been studied.

Although radioisotopes have been used for many years in medical science, their use by industry is more recent. It was not until 1946, when the Atomic Energy Commission began supplying large quantities of radioisotopes at low cost, that industry became active in the application of isotopes to their problems. Since then industry has used radioisotopes for tracer studies, as a source of radiation energy, and in production control.

Radioisotopes as Tracers

One of the outstanding current applications of radioisotopes is in the study of engine wear and lubrication. This work is leading to production of better lubricants, as well as to the better design of diesel, automotive, and aircraft engines. After "tagging" a piston ring with a radioisotope, some of the radioactive atoms will be transferred from the piston ring to the oil during the motor's operation. Periodic sampling and radioactive analysis of the oil lubricant will show just how much the ring is wearing away by friction. During the motor's operation, radioactive atoms will also be transferred from the piston ring to the cylinder wall. By placing a photographic film against the inside surface of the cylinder wall, the radioactivity collected there will show on the photographic film and indicate the regions of the rings' greatest wear. Tests such as these, that previously required several weeks, can now be done with more accuracy in a few hours to a few days.

Radioisotopes are being used by the ceramic industry to study the mechanism of adhesion of their products to base materials. This should result in more chip-resistant surfaces for such products as stoves, refrigerators, and bath tubs.

The electrochemist has used radioisotopes to study self-diffusion in metals and the segregation of trace quantities of metals in alloys.

Radioactive methods are leading to important discoveries in soil nutrition. Significant increases in the world's agricultural productivity may consequently result. Phosphate fertilizer labeled with radioactive phosphorous permits the chemist to determine how much phosphorous is taken in by a plant as well as where it came from. Their findings may then provide the basis for evaluating the efficiency of the fertilizer, the best place to locate it with reference to the position of the plant, and the length of its beneficial effects on crop yields.

Radiation Chemistry

Large quantities of radioactive material, fission products, are stored at Oak Ridge, Tennessee, and Hanford, Washington. This fission product is the so-called atomic garbage resulting from the production of plutonium. It is highly radioactive. This material has recently been made available to industry at low cost.

Research has already shown that the radiation from fission products will polymerize such monomers as styrene, methyl methacrylate, and acrylonitrile. The antibiotic industry is financing a program to determine the feasibility of sterilizing its products with radiation. Encouraging results on the sterilization of food with radiation have been reported. The fuel engineer is studying the effects of radiation on the ignition of fuel in an internal-combustion engine. As a result

of this work it may be possible to operate engines with a much leaner fuel mixture than ever before. There is also evidence that radioactive radiation can be substituted for the more expensive ultraviolet radiation in certain chemical reactions. Certainly, this field holds much interest for industry not only as a source of cheap energy but as a possible tool for producing new products.

Production Control

The thickness of such materials as paper, plastics, and rubber may be measured rapidly and accurately (within 0.000015 inch) with radioisotopes. The material to be measured is placed between a capsule containing a radioisotope and a radiation detector or thickness gage. The absorption of the radiation by the material may be measured by the radiation detector to indicate the thickness of the material.

Radiation is absorbed to some degree by everything it penetrates. Advantage of this is taken in the radioactive height gage. A cobalt-60 source of gamma radiation is placed on one side of a tank and a radiation detector on the opposite side. The source of radiation and the detector simultaneously move up and down the outside of the tank. When the gamma rays contact the material in the tank there is an absorption of the rays. The decrease in the gamma-ray intensity is immediately recorded by the detector. Thus the height and the volume of the material in the tank can be determined.

Techniques employing radioisotopes have been used to follow the movement of inaccessible parts of an engine. In our own laboratory we have constructed a radioactive tachometer by embedding a small radioactive cobalt-60 wire on the periphery of a cog deep inside of an engine. A Geiger counter placed outside the housing of the engine records a deflection of the indicator needle each time that the cobalt-60 passes close to the counter. Each deflection of the needle corresponds to one revolution of the cog.

Radioactive isotopes can also be used as an intense portable form of gamma rays for radiography. Radiography consists of placing a source of penetrating radiation on one side of a test part and a photographic film on the other. A flaw is detected as an increase in the exposure of the film because less of the radiation is absorbed by this area of the part. By this method, on-the-site radiographs can be made of parts too large to be X-rayed by conventional methods.

Industry has been unable to take full advantage of the use of radioisotopes because of the lack of trained personnel. However, many universities are now offering courses in radiochemistry and nuclear physics. The Atomic Energy Commission at the Oak Ridge Institute of Nuclear Studies is training representatives of industry in radioactive techniques. Radiochemical laboratories such as Battelle's provide on-the-job training for personnel. As more technicians become available one can expect a greater use of radioisotopes in industry.

Radioisotopes as a research and production control tool extend our ability to investigate complicated processes and to study extremely low concentrations of materials. As a source of radiation energy they may provide us with new products and lower the manufacturing cost of existing products. This should consequently aid industry in unraveling the mysteries of many of its unsolved problems.

Notes From Battelle

ELECTROFORMING — A FAST-GROWING INDUSTRY

Electroforming is now used in the annual production of over $500,000,000 worth of metal products in the United States. This is the estimate of C. L. Faust and W. H. Safranek of the Battelle staff. They point out that the process can be used for mass production of articles as well as for special custom jobs. Some mass-produced electroformed articles are fountain pen caps, mechanical pencils, band instruments, radar feed horns and wave guide components, tubing and pipe, and instrument parts. Special electroforming jobs include searchlight reflectors and molds for radomes up to 15 feet.

Electroforming is essentially a process in which a thick layer of metal is electrodeposited on a mandrel or matrix that later can be removed, to leave a self-supporting shell, sheet, or formed article. However, electroforming is also used for coating metal parts to provide special surface-metallurgical properties, to replace locally worn surface metal, to replace metal machined away by mistake, and for shaping parts by electrolytic machining. Manufacturers now have many metals available for electroforming. These include copper, nickel, iron, cobalt, zinc, brass, chromium, lead, lead-tin, tin, cadmium, silver, silver-lead, gold, platinum, and, just recently, aluminum.

Electroforming equipment costs are considerably lower than those for machine tool work producing the same dollar volume of products. The electroforming process has been found more economical where several annealing processes or costly molds are required. It is considered the only successful method where intricate surface design and fine detail are important, as in dies for reproducing wax records, or where smooth surfaces are required in inaccessible places, as in radar wave transmission pipe. Continued research is expanding the possibilities of this method of manufacture.

SUGGESTED IMPROVEMENT IN STANDARD NOTATION

J. W. Clegg of Battelle has suggested the following method of improving the standard notation now taught for very large or very small numbers. He writes in the *Mathematics Teacher* for February, 1952:

"In the physical sciences it has long been customary, for the representation of very large or very small numbers, to use a number of a magnitude between 1 and 10 multiplied by 10 to the appropriate power, as 6.06×10^{23}, or 1.84×10^{-5}. Not only is this notation cumbersome, but it also uses the awkward "$\times$" to indicate multiplication and presents the opportunity for its confusion with "x" standing for an unknown quantity.

"To overcome these objections, the writer proposes an exponential notation in which the power of 10, by which the decimal number is to be multiplied, is placed as a superscript over the decimal point, thus: $6^{23}_{\cdot}06$ and $1^{-5}_{\cdot}84$. This notation is logical and concise. It may be as readily set up in type, employed for typewritten material, or written by hand, as the older notation with "$\times$". The superscript may conveniently be regarded as the number of places the decimal point must be moved to the right, if the exponent is positive, or to the left, if negative."

QUALITY CONTROL—TOOL OF INDUSTRY

"Aren't there foremen, operators, and inspectors who, by proper teamwork, can maintain high quality standards while meeting production schedules, without all the fuss and bother connected with the calculations and charts which are prescribed by Quality Control?" This question is posed by Earl Lamm of the Engineering Economics Division of Battelle in his article, "Introducing Quality Control to Shop Personnel," in the March, 1952, issue of *Modern Machine Shop*.

His answer was, "Of course there are—but there aren't enough of them." The writer goes on to point out that the foreman and supervisors who can do a quality production job are already loaded down with other duties. They often are responsible for such matters as establishing time standards, wage rates, and manufacturing methods. Moreover, when these excellent men are off the job, where can others be found who can do the job as well?

How does quality control help to maintain or improve quality? Lamm explains it this way: "By combining the best in inspection techniques with the most useful laws of statistics, into a formal, scientific method which can be applied to practically all products and processes." He points out that quality control can help by making important information available. Thus, the natural tolerances of each machine in a shop may be charted—important data in the planning of pro-

duction. Quality trends of each machine can be made available to help the foreman spot trouble before really defective products result. Quality control can also help to reduce inspection costs by determining, on a logical and scientific basis, just how much and what type of inspection should be used.

The writer concedes that the use of quality control does not necessarily guarantee a quality product. "All that is claimed," he says, "is that it usually makes the task of maintaining or improving quality *easier* and *cheaper*."

WORK ON AREA RECTIFIERS

The United States Air Force has been having difficulty with the area rectifiers it is now using in its planes. The selenium, copper oxide, and copper sulfide area rectifiers are failing to operate efficiently over the required temperature range of 200°C. with a lower limit of —70°C.

This led to the setting up of a research project at Battelle with the aim of developing a new area rectifier to meet the requirements. Experiments with various materials showed that reduced titanium dioxide has many of the properties needed in a good rectifier. At the present time, it appears that TiO_2 may be developed into a satisfactory high-temperature rectifier. However, there are several major problems to be worked out. One of these is the control of the impurities present in the starting titanium. It appears that purifying the titanium will improve reproducibility from one rectifier to another. Another problem concerns the stabilization of the barrier layer under all conditions of operation at high temperature. Work on all these problems is going ahead.

BETTER OIL-PUMPING METHODS

The country's oil producers and their equipment suppliers are out to learn more about sucker-rod pumping systems than has ever been known before.

Scheduled to get under way about June first, a three-year study of the technology of sucker-rod pumping systems has been outlined by representatives of the industry. A Steering Committee has been formed and currently is inviting industry-wide support for the program.

The committee is composed of L. A. Little, Lufkin Foundry and Machine Company, Lufkin, Texas; J. R. Mahan, National Supply Company, Toledo, Ohio; L. A. Ogden, The Pure Oil Company, Tulsa, Oklahoma; and H. H. Kaveler, Phillips Petroleum Company, Bartlesville, Oklahoma, chairman.

"We certainly will welcome more efficient and cheaper pumping on all wells, but it's the deep ones, say, 6,500 feet or below, that make it really imperative that we develop more productive, less costly techniques," Chairman Kaveler states.

The pivotal product of the pending three-year study is an analog computor, or "simulator," that will be equivalent to the entire sucker-rod system. All measurable factors (energy input, volume lifted, etc.) will be set into this simulator and unknown factors determined with reference to any well being pumped or scheduled to go on the pump.

Once the simulator is successfully developed, the Steering Committee members anticipate a greatly improved pumping technology. Possible improvements include:

1. Development of a basis for design of new pumping-unit installations and for determining a more efficient way to operate pumping units already installed.
2. A scientific basis for using dynamometer cards to diagnose troubles in operations.
3. Answers to countless questions on counter balancing, pumping strokes and speeds, sucker-rod shock absorbers, hydraulic vs. beam units, the "geometry" of pumping units, and others.

The three-year development program is to be conducted in the Battelle laboratories.

"ALUMNI" TO GATHER

Past and present members of the Battelle staff will assemble at luncheon on the opening day of ASTM's Fiftieth Anniversary Meeting in New York.

The luncheon is scheduled for Monday noon, June 23, at the Hotel Statler. That same afternoon Dr. Norman L. Mochel (see inside front cover), Manager, Metallurgical Engineering, Westinghouse Electric Corporation, will present the First Annual H. W. Gillett Memorial Lecture. Dr. Gillett was one of America's leading technologists and the first Director of Battelle Institute.

Battelle "alumni" interested in attending the luncheon should make advance reservations by mail with R. O. Stith, Battelle Memorial Institute, Columbus 1, Ohio. Luncheon tickets will be $3.50 per person.

National Science Foundation's Report

THE National Science Foundation has issued its First Annual Report. The Foundation, established by act of Congress on May 10, 1950, was a new departure for the United States. In that act, the American people, through their elected representatives, decided that fundamental, scientific research was of such great national importance that Federal funds should be spent in its support.

The first report, of necessity, is concerned largely with the making of plans. Nevertheless, it includes much that is of interest to the fields of industry and research. The following excerpts have been selected because they are of wide general interest.

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Among the questions which need to be answered in developing a national policy in basic research and education in the sciences are the following:

- What is the total financial support now being provided for scientific research?
- What is the distribution of this support among the three major sources—Government, industry, and educational institutions?
- What amount of financial support can and should be provided, and what is the most desirable distribution from among the available sources of support?
- What is the division of research effort among the various natural sciences?
- What areas need greater emphasis and what less?
- What means can be developed to shorten the period between discovery and practical application?
- What are the present and future needs for trained scientific manpower?
- What is the impact of Government support of research programs on the educational process in universities and colleges?
- What is the effect of Federal research programs on the financial stability of universities?

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It appears that the Nation is currently spending about 2½ billion dollars a year for all research and development activities, of which the Federal Government supplies between 60 and 70 per cent, while the universities supply about 5 per cent. While industry provides 25 to 35 per cent of the funds for research and development, nearly two-thirds of the entire amount is actually spent in industrial laboratories and facilities. Slightly more than 10 per cent of the work is done at the universities.

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The Engineering College Research Council found that one-fifth of the college research effort is in the field of physics and nearly one-half in the three areas of physics, chemistry, and electronics. Another 25 per cent of the defense research work is in aeronautical and electrical engineering, mathematics, and the earth sciences. Chemical engineering, food technology, ceramics, astronomy, industrial engineering, marine engineering, petroleum and fuels engineering, and mining engineering together account for less than 10 per cent.

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The National Research Council finds that more than half of the industrial scientists and engineers are located in five states—New York, New Jersey, Pennsylvania, Illinois, and Ohio. California is the only other state having comparable research activities.

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The Research and Development Board estimates that 130,000 engineers and scientists in the United States are engaged in research and development. About 55 per cent of these work in industrial laboratories, about 25 per cent in universities and nonprofit institutions, and the remaining 20 per cent in Federal and state facilities.

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The National Science Foundation will sponsor research to develop new techniques for the quick and economical dissemination of scientific information. This research will be designed to improve existing methods of abstracting information, to study the use of mechanical and electronic means for compiling bibliographies and other reference materials, to encourage more rapid ways of preparing and processing reports and other units of scientific literature, and to design better methods for making these units of scientific literature available to scientists.

RECENT PAPERS BY THE RESEARCH STAFF*

Machinability of Metals. F. W. Boulger. *Canadian Metals*, February, 1952.

The Aspergillus Niger Method for Determining Copper in Soils. Marjorie Dole. *Soil Science*, February, 1952.

Electroforming Produces Intricate Shapes to Close Tolerances. C. L. Faust and W. H. Safranek. *Tool Engineer*, April, 1952.

Solubility of Carbon and Oxygen in Molybdenum. W. E. Few and G. K. Manning. *Journal of Metals*, March, 1952.

Metallography. G. K. Manning. *Encyclopedia of Chemical Technology*, Volume 8, 1952. Published by The Interscience Encyclopedia, Inc., New York.

Bituminous Coal Research. H. W. Nelson and R. B. Engdahl. *Mining Congress Journal*, February, 1952.

Objective Test Methods for Paint Brushes. M. J. Snyder, E. R. Hunt, and J. W. Clegg. *ASTM Bulletin*, February, 1952.

Influence of Carbon on the Lattice Parameter of Molybdenum. Rudolph Speiser, J. W. Spretnak, W. E. Few, and R. M. Parke. *Journal of Metals*, March, 1952.

Science, Technology, and World Resources. J. D. Sullivan. Chapter in *World Population and Future Resources, 1952*. Published by American Book Company.

A Spectrophotometric Study of the Oxidation of Tantalum. J. T. Waber, G. E. Sturdy, E. M. Wise, and C. R. Tipton. *Journal of the Electrochemical Society*, March, 1952.

**In most cases reprints will be available upon request to the Editor of the* BATTELLE TECHNICAL REVIEW

A Word About Battelle Technical Review Abstracts

The abstracts that appear in the following pages are prepared from approximately 900 American and foreign technical journals, as well as from books and other literature received in the Battelle Library. Prepared by a professional staff trained in various technological fields, the abstracts are selected for their usefulness to the Battelle research staff. They are now being made available to technologists and scientists in industry and research in all parts of the world, through the pages of the *Battelle Technical Review*.

BATTELLE TECHNICAL REVIEW ABSTRACTS

SECTION INDEX

AGRICULTURAL RESEARCH 350a
Plant and animal nutrition; insecticides; fungicides; fertilizers; weed control; soils; etc.

ANALYSIS—CHEMICAL AND PHYSICAL 307a
Methods and apparatus for qualitative and quantitative determination of the composition of matter.

APPARATUS, METHODS, AND STANDARDS 312a
Industrial measurement, inspection, and control; laboratory equipment and procedures (except when auxiliary to other subjects); standards and specifications.

CERAMICS 322a
Abrasives; inorganic cements; glasses; ceramic coatings; structural clay products; refractories; whitewares.

CHEMICAL TECHNOLOGY 332a
Chemical engineering and process equipment; chemistry of materials such as wood, paper, textiles, and coal and petroleum by-products; petroleum refining.

CHEMISTRY—GENERAL, INORGANIC, AND PHYSICAL 335a

CHEMISTRY—ORGANIC 342a

CLEANING, FINISHING, AND COATINGS—METALLIC 289a
Buffing and polishing; chemical and electrochemical cleaning and coatings; diffusion, dip, oxide, sprayed, weld-deposited, and vapor-deposited coatings; cladding.

CORROSION 305a
Theory, measurement, and prevention (except by means of coatings).

DESIGN 330a
Design of parts, equipment, and structures (except when auxiliary to other subjects); theoretical stress analysis.

ELECTRICITY AND ELECTRONICS 260a
Electrical and electronic theory, circuits, equipment, and applications (except when auxiliary to other subjects).

FOUNDRY PRACTICE 282a
Melting; casting; pouring; rigging; shakeout and trimming; molding; core and pattern making; metallurgical control.

FUEL TECHNOLOGY 321a
Solid, liquid, and gaseous fuels—their properties and combustion; carbonization, liquefaction, and gasification of solid fuels; synthetic fuels. (For combustion in engines, see Section 21.)

GRAPHIC ARTS 364a
Printing and decorating processes, equipment, and materials; book manufacture; photography.

HEATING, DRYING, AND AIR CONDITIONING 323a
Space heating; cooling; humidification; materials drying and heating; equipment such as ovens, boilers, furnaces, heat pumps, and auxiliaries.

LUBRICATION AND FRICTION 330a
Lubricants and lubricating methods; friction fundamentals; nonmetallic bearing materials; oil filtration; lubricating-system design.

METALLOGRAPHY AND PRIMARY STRUCTURES 292a
Microscopy, diffraction methods and other techniques; phase diagrams; nuclear and crystal structures; microstructures; macrostructures. (For structures resulting from transformation or deformation see Sections 11 and 13, respectively.)

METALS—FABRICATION AND USES 319a
Miscellaneous fabrication procedures; applications of metals, alloys, and specific processes.

SECTION INDEX (Continued)

METALS—MECHANICAL PROPERTIES AND TESTS 300a
Elasticity and plasticity; stresses and stress analysis; fracture; creep; shear; hardness; fatigue; wear resistance; deformation structures.

METALS—PHYSICAL PROPERTIES AND TESTS 296a
Mass, thermal, thermodynamic, chemical, electrical, magnetic, and optical properties.

METALS—PRIMARY WORKING 283a
Preparation for working; forging; rolling; extrusion; swaging; tube making; wire and rod drawing; slitting, sawing, shearing, etc.

METALS—SECONDARY WORKING 284a
Drawing; impact extrusion; forming; stamping; machining and machinability; grinding; honing and lapping; strain hardening; shot peening; flame cutting.

METALS—SMELTING, REDUCTION, AND REFINING 279a
Smelting and reduction of ores; distillation of metals; electrolytic winning and refining; thermit processes; cementation; amalgamation; carbonyl, halide, and hydride processes; ingot practice.

METALS—THERMAL TREATMENT 288a
Homogenization; annealing; normalizing; patenting; quench, precipitation, and case hardening; tempering; stress relief; cold treatment; heating and cooling media. (For effects of thermal treatment, see Sections 11, 12, and 13.)

METALS—TRANSFORMATIONS AND RESULTING STRUCTURE. 294a
Diffusion; nucleation and grain growth; recovery and recrystallization; allotropic transformations; precipitation; eutectoid reactions; other solid-state reactions; liquid-phase reactions; solid-liquid, vapor-solid, and vapor-liquid reactions.

METALS—WELDING OR JOINING 286a
Welding; soldering; brazing; weldability and weld tests; bonding metals to nonmetals; adhesive bonding; mechanical fastening.

MISCELLANEOUS 367a
Research and research organizations; general metallurgical articles; mathematics; medical research; patent law; other unclassified subjects.

ORE AND MATERIAL BENEFICIATION 277a
Preparation and concentration of solid materials; roasting; calcining; sintering; nodulizing; briquetting; mineralogy.

PAINTS, VARNISHES, LACQUERS, AND ENAMELS 349a
Organic and inorganic coatings (except ceramic coatings); their composition, properties, application, and testing.

PHYSICS 354a
Theory and practice (except as covered in other sections). Includes aerodynamics; biophysics; flow of gases and liquids; deformation of solids; heat transfer; nucleonics; semiconductivity and superconductivity; ultrasonics; etc.

PLASTICS AND HIGH POLYMERS 346a
Polymerization; properties; testing; processing methods and equipment; compounding. (Does not include rubbers and surface-coating resins.)

POLLUTION AND WASTES 320a
Sampling, analysis, collection, prevention, and treatment of gaseous and liquid wastes, including smoke, fumes, odors, fly ash, dusts, aerosols, sewage, and industrial wastes; by-product recovery; meteorological, topographical, and biological effects.

POWDER METALLURGY 285a
Powder production and properties; mixing; compacting; sintering; post-sintering operations.

PRIME MOVERS 324a
Reciprocating engines; turbines; jet engines; rockets; locomotives; auxiliary equipment; power from atomic fission.

RUBBERS AND OTHER ELASTOMERS 348a
Polymerization; properties; testing; processing methods and equipment; compounding.

STATISTICS AND ECONOMICS 365a
Natural resources; supplies; production and cost data; articles on economic trends.

BATTELLE TECHNICAL REVIEW

Volume 1, Number 5

ABSTRACTS†

May 1952

1. ORE AND MATERIAL BENEFICIATION

5048* Joint Action of Certain Reagent-Collectors During Flotation Concentration. (In Russian.) I. N. Plaksin and V. A. Glembotskii. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 1, 1952, p. 139-141.

Mixtures of ethyl and isoamyl xanthates were used in flotation experiments with various sized particles of galena. Results are discussed and tabulated.

5049* Milling Asbestos Ore. W. E. Sinclair. *Asbestos*, v. 33, Mar. 1952, p. 8, 10, 12, 14, 16, 18.

A critical review of milling practice in different fields, and the modern trend, as influenced by class of fiber and local experience. (To be continued.)

5050* The Adsorption of Sodium Cetyl Sulphate on Cassiterite. G. R. Edwards and W. E. Ewers. *Australian Journal of Scientific Research*, ser. A, v. 4, Dec. 1951, p. 627-643.

Above adsorption on pure synthetic cassiterite was measured under various conditions of concentration and pH, and the results related to flotation. It was found that only a small proportion of the surface need be covered with collector ions to make flotation possible. A mechanism for adsorption of cetyl sulfate ions is proposed, in which these ions exchange with hydroxyl on the hydrated surface. An attempt is made to describe ionic equilibria at the cassiterite surface. Samples of natural cassiterite differed from one another and from the synthetic mineral, in their ability to be floated under certain conditions. This is attributed to the effect of metallic impurities. 20 ref.

5051* Coal Preparation and Its Relationship to Mineral Dressing. (Concluded.) E. Swartzman and L. E. Djingheuzian. *Canadian Mining Journal*, v. 73, Mar. 1952, p. 70-77.

Second half of a comprehensive review. Presents varied aspects of mechanical cleaning. Covers launder washers, jig washers, concentrating tables, heavy-media processes, and froth flotation. Describes drying methods. Flow sheet, photographs, and 11 ref.

5052 Hydrogen Tube Reduces Oxides. *Chemical Engineering*, v. 59, Mar. 1952, p. 252.

Describes recent pilot-plant work which shows that metallic oxides can be reduced continuously with hydrogen in a simple furnace. Close temperature control is vital. Work was done on iron oxides, but application to other metals is believed feasible.

5053* Flotation of Pyrite From Residue in Acid Mine Water. J. E. Clay and Philip Rabone. *Journal of the Chemical, Metallurgical & Mining Society of South Africia*, v. 52, Nov. 1951, p. 97-104; disc., p. 105-108.

Describes laboratory flotation tests on a cyanide residue containing about 2% FeS_2 as pyrite with a trace of pyrrhotite and no marcasite. A recovery of 90% of the pyrite was obtained in a concentrate of saleable grade (over 40% S) with a reasonable consumption of reagents. Flotation results and operational data obtained in a semicontinuous pilot plant over a 2-mo. period are given.

5054* Report of Tests Carried Out on the Swing Hammer Pulverizer. C. E. Bird. *Journal of the Chemical, Metallurgical & Mining Society of South Africa*, v. 52, Nov. 1951, p. 109-117.

Discusses the above used for crushing coal. Equipment is illustrated; data are tabulated and charted.

5055 World's Major Titanium Mine & Smelter Swing Into Full-Scale Production. Alvin W. Knoerr. *Engineering and Mining Journal*, v. 153, Mar. 1952, p. 72-79.

Surveys the above, located at Sorel, Quebec. Includes a flowsheet and description of the refining process used to produce a rich Ti slag and iron. Illustrations.

5056* Change of Electrical Resistance of Magnetite During Magnetization. (In Russian.) M. A. Grabovskii. *Izvestiia Akademii Nauk SSSR*, Geophysical Series, July-Aug. 1951, p. 61-70.

The above was investigated. The results are considered from the standpoint of the theory of ferromagnetism. Data are charted. 22 ref.

5057* Theory of Magnetic Separation of Weakly-Magnetic Ores. (In Russian.) V. G. Derkach. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, June 1951, p. 852-862.

An investigation was made of the above by an analysis of the magnetic and mechanical forces acting on the pieces of ore. Includes both theoretical curves for magnetic ores in general and for Mn and Fe ores.

5058* Protective Action of Ammonium Salts During Flotation of Pyrites, Arsenopyrites and Certain Other Sulfide Minerals in Calcareous Media. (In Russian.) I. N. Plaksin and G. A. Miasnikova. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, July 1951, p. 1046-1064.

Studies were made on action of lime and NH_4Cl during flotation of above minerals. The specific action on each of the minerals was determined. Data are discussed, tabulated, and charted. 21 ref.

5059* Theory of Crushing of Rocks. (Minerals). II. Separation of Particles Into Two Fractions and Calculation of the Average Composition of These Fractions. (In Russian.) B. M. Zviagin, R. B. Rozenbaum, O. M. Todes, and A. Z. Iurovskii. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Aug. 1951, p. 1218-1229.

A method is given for determination of the relative number of floated and settled particles during their separation into two fractions. Data are tabulated and charted.

5060* Sludge Recovery From Coal Cleaning Plants. *Mining Congress Journal*, v. 38, Mar. 1952, p. 49-52.

Surface Preparation Committee reports typical examples of recovery processes with data on tonnage reclaimed and the size consist of solids in the waste water before and after treatment. Comprises introduction plus the following papers: "Sludge Recovery in Strip Mining", J. J. Merle; "Sludge Recovery and Water Clarification", T. O. Wash, Jr., and W. R. Cuthbert; and "Sludge Recovery to Prevent Stream Pollution", V. D. Hanson.

†Prepared from books, journals, and other material received by the Battelle Memorial Institute Library.

1. *Ore and Material Beneficiation*

5061 Ultra-Fine Grinding and Classification With Fluid Jet Pulverizers. M. F. Dufour and J. B. Chatelain. *Mining Engineering*, v. 4, Mar. 1952, p. 262-264.

Describes and diagrams above process for size reduction. Materials processed by this grinding method include nonmetallic and metallic minerals, ores, metals, pigments, insecticides, fungicides, pharmaceuticals, plastics, dyes, and numerous other organic and inorganic products.

5062 Contact Angles and Surface Coverage. W. Philippoff, S. R. B. Cooke, and Donald E. Cadwell. *Mining Engineering*, v. 4, Mar. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 193, 1952, p. 283-386.

Presents and discusses results of an investigation to determine quantitative relationship between the surface coverage of the mineral by the reagent, length of the hydrocarbon chain, and contact angle in flotation.

5063* Some Recent Developments in Shallow Bath Heavy Media Coal Washing Plant. H. Y. Robinson. *Mining Journal*, 238, Feb. 22, 1952, p. 199-201.

Discusses the above. Presents diagrams of deep and shallow bath units.

5064* How To Produce More Tungsten. Blair Burwell. *Mining World*, v. 14, Apr. 1, 1952, p. 33-37, 88.

Gives the metallurgical results and operating costs of Salt Lake City chemical tungsten refinery. Indicates that integration of tungsten milling and chemical refining plants should create a market for low-grade material and assure production from many new mines.

5065* Factors Affecting Flotation. Part I. H. J. Gisler. *Pit and Quarry*, v. 44, Mar. 1952, p. 121-125, 131.

Reprinted with changes from a Denver Equipment Co. bulletin. Analyzes above and suggests methods of controlling grade of ore, tonnage, grind, dilution, time, temperature, and reagents. Photographs. (To be continued.)

5066 Flotation Process Applied to Silica. Walter B. Lenhart. *Rock Products*, v. 55, Feb. 1952, p. 100-103.

Describes Del Monte Properties Co.'s process which uses attrition machine preliminary to froth-flotation removal of impurities in production of silica. The attrition machine is designed to scour and scrub the individual grain particles.

5067* Equipment for Beneficiating Glass Sand. (In Russian.) I. B. Shlain. *Steklo i Keramika*, v. 8, Aug. 1951, p. 8-10.

Choice of equipment for the above is discussed in relation to types and amounts of impurities, location of the deposit, and similar factors.

5068* Beneficiation of Refractory Clays by Electro-Osmosis. (In Russian.) I. I. Tukh, K. I. Tugusheva, and N. E. Karisma. *Steklo i Keramika*, v. 8, Aug. 1951, p. 10-12.

The above is described and discussed. Analytical data are tabulated and charted; apparatus is illustrated.

5069* Air-Bubble and Flotation Processes. (In German.) Philipp Siedler, *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 5, Feb. 1952, p. 49-54.

Reviews the above on the basis of the literature, particulary the role of the carrier gas, forces at the boundary surface, and the problem of adhesion of the mineral particle to the air bubble. Theories on the interpretation of the above phenomena are discussed. 23 ref.

5070* Problems in the Roasting of Magnetized Iron Ore in Rotating Kilns. (In German.) Walther Walbrecker. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 5, Feb. 1952, p. 54-61.

Outlines practical suggestions for above process, particularly concerning grain size, determination of optimum roasting temperature, and duration of roasting and cooling. Constructional changes practical for increasing of the output of smaller furnaces are indicated. Data are tabulated and charted.

5071* Treatment of Manganese Slimes and Ores With Sulphur Dioxide Gas. (In Russian.) V. M. Kakabadze. *Zhurnal Prikladnoi Khimii*, v. 24, July 1951, p. 682-689.

The conversion of $MnCO_3$ ores to $MnSO_3$ by SO_2 gas, followed by oxidation to $MnSO_4$, was investigated. Combinations of this treatment with roasting and H_2SO_4 treatment are also discussed. Data are tabulated and charted.

Miscellaneous Publications

5072 Nature and Operation of Pan Sintering With Special Reference to Fine Ores. H. Huisken. Henry Brutcher, Translation 2820, 22 pages. (From *Stahl und Eisen*, v. 71, July 5, 1951, p. 701-707)

Previously abstracted from original.

5073 Heavy Media Coal Preparation Plant Design and Performance. R. C. Woodhead. *Proceedings of the Illinois Mining Institute*, v. 59, 1951. p. 53-59. (TN1 I6p)

Surveys the above.

5074 Recovery of Fine Coal by Flotation and Tabling. Raymond P. Kloepper. *Proceedings of the Illinois Mining Institute*, v. 59, 1951, p. 53-59. (TN1 I6p)

Describes and illustrates equipment and procedures for the above at United Electric Coal Companies, Fidelity Mine, DuQuoin, Ill.

5075 The Recovery of Finished Pyrite From Mine Refuse. Elmer H. Citron. *Proceedings of the Illinois Mining Institute*, v. 59, 1951, p. 74-79. (TN1 I6p)

Describes operations of Pittsburg & Midway Coal Mining Co., Pittsburg, Kansas. A pilot plant was built in 1933 and a commercial plant operated from 1936 to 1939. It produced a good grade of coal and a high-grade finished pyrite, the latter being sold to Monsanto for sulfuric acid manufacture. Includes flow diagram.

5076 Process for Recovering Gold and Silver From Activated Carbon by Leaching and Electrolysis. J. B. Zadra, A. L. Engel, and H. J. Heinen. U. S. Bureau of Mines, Report of Investigations 4843, Feb. 1952, 32 pages. (TN21 Un3r)

Describes modified process for removal or desorption of both Au and Ag from loaded carbon. This modified process permits use of activated carbon for extracting both metals from Au ores carrying enough Ag to have economical interest, or in which Ag is the predominant value. Hot caustic cyanide solution at atmospheric pressure is used for extraction of both Au and Ag from activated carbon by simultaneous leaching and electrolysis.

5077 Beneficiation of Oxide Manganese Ores From Arapahoe, Douglas, Saguache, Custer, Chaffee, and Park Counties, Colo. R. R. Wells, K. C. Vincent, and T. F. Mitchell. U. S. Bureau of Mines, Report of Investigation 4845, Feb. 1952, 16 pages. (TN21 Un3r)

5078 Concentration of Oxide Manganese Ores From San Bernardino County, Calif. W. W. Agey, S. J. Hussey, and W. J. Long. U. S. Bureau of Mines, Report of Investigations 4846, Feb. 1952, 14 pages. (TN21 Un3r)

Test work included the following: heavy-media separation, tabling of sized fractions, manganese flotation and flotation of table slimes; jigging; magnetic concentration; etc.

5079 Concentration of Oxide Manganese Ores From Vicinity of Winkelman, Pinal County, Ariz. K. C. Dean, H. D. Snedden, and W. W. Agey. U. S. Bureau of Mines, Report of Investigations 4848, Feb. 1952, 21 pages. (TN21 Un3r)

Books

5080 The System of Mineralogy of James Dwight Dana and Edward Salisbury Dana. Vol. II. Ed. 7. Charles Palache, Harry Berman, and Clifford Frondel. 1124 pages. 1951. John Wiley and Sons, New York. (QE372 D19s7)

Reference book treatment of halides, nitrates, borates, carbonates, sulfates, phosphates, arsenates, tungstates, molybdates, etc. Chapter references.

See also:
5056 (magnetization of magnetite)
5772 (sampling lump-form materials)

5839 (recovery of fine coal and sulfur)
6043 (Al production)
6072 (copper ore concentration)
6719 (fluidized-bed sulfide roasting)

2. METALS—SMELTING, REDUCTION, AND REFINING

5081* Radiochemical Investigation Methods For Metallurgical Processes. (In German.) Walter Koch and Kurt Fink. *Archiv für das Eisenhüttenwesen*, v. 22, Nov.-Dec. 1951, p. 371-375.

By adding radioactive sulfur, S^{35}, to the fuel for an openhearth furnace, the ratio of S passing into the steel from the heating gas was determined. Results are charted and discussed. Schematic diagrams illustrate the equipment used.

5082* Specific Electrical Conductivity of Slags Containing Ferrous Oxide. (In German.) Wilhelm Anton Fischer and Hans vom Ende. *Archiv für das Eisenhüttenwesen*, v. 22, Nov.-Dec. 1951, p. 417-423.

Describes investigations on the above on slags of various composition, in the molten state. From the temperature dependence of specific conductivity, the activation energy of all but the semiconductive slags was calculated. Results are discussed; data are tabulated and charted.

5083* Acid Smelting of Manganese-Containing Iron Ores For the Production of Synthetic Manganese Ores and Their Smelting For Ferromanganese Production. (In German.) Paul Ischebeck and Jacob Willems. *Archiv für das Eisenhüttenwesen*, v. 23, Jan.-Feb. 1952, p. 1-14; disc., p. 14-15.

Reviews the literature on methods of stepwise oxidation and reduction for production of Mn-rich concentrates and of ferromanganese from iron ores. Laboratory tests prove the possibility of synthesizing low-phosphorus Mn slags by acid smelting of Mn-containing iron ores; and large-scale experiments prove the industrial feasibility of the process. Data are tabulated and graphed.

5084* Melting Crucible of Calcium Phosphate; Metallurgy of the Basic Bessemer Process. (In German.) Gerhard Trömel and Willy Oelsen. *Archiv für das Eisenhüttenwesen*, v. 23, Jan.-Feb. 1952, p. 17-20.

The $FeO\text{-}3CaO\cdot P_2O_5$ constitution diagram indicates that calcium orthophosphate is a suitable crucible material for studying the equilibrium between molten Fe and P-rich slags. Production of this type of crucible is described and it is shown that iron melted in them contains only 0.025% P. Data are charted.

5085* The Solubility of Oxygen in Iron Melts Under Ferrous Oxide, Silica, and Lime-Saturated Ferrous Oxide Slags at Temperatures of 1530-1700°C. (In German.) Wilhelm Anton Fischer and Hans vom Ende. *Archiv für das Eisenhüttenwesen*, v. 23, Jan.-Feb. 1952, p. 21-23; disc., p. 33.

Describes methods of chemical, metallographic, and X-ray analyses applied to above problem. Melting chemically pure iron oxide and lime in a soft-iron crucible at 1400-1450°C. yielded an isotherm in the $CaO\text{-}FeO\text{-}Fe_2O_3$ system which showed that, with increasing lime contents, the iron oxide content of the molten slag increases in equilibrium with iron, forming a lime ferrite. Graphs, tables, photomicrographs, X-ray diagrams, and numerous references.

5086* Recent Developments in Blast Furnace Practice. J. K. Brandwood. *Australasian Institute of Mining and Metallurgy, Proceedings*, new ser., Mar. 31-June 30, 1947, p. 151-172.

Briefly covers manufacturing of iron for the iron-and-steel industry. Historical data concerning development of the furnace itself from early days is followed by the modern ideas on raw materials and their beneficiation. Recent furnace design and modern auxiliaries are included along with some developments in practical operation.

5087* Coal Utilization in Modern Steelworks Practice. J. D. Norgard and W. H. Brook. *Australasian Institute of Mining and Metallurgy, Proceedings*, new ser., Mar. 31-June 30, 1947, p. 255-278.

Describes what happens to the coal consumed annually by a modern steel plant. Compares the 3 tons of coal per ton of finished product of 35 yrs. ago and the present consumption of 1½ tons of coal per ton of finished product.

5088 Solidification and Segregation in Killed Steel Ingots. Edward A. Loria. *Blast Furnace & Steel Plant*, v. 40, Apr. 1952, p. 410-415.

Discusses mode and type of solidification and relation to segregation. 12 ref.

5089 Electric Furnace: New Customer For Coal Industry. *Business Week*, Mar. 29, 1952, p. 50-52, 54, 59.

Discusses technical and economic factors of the electric-furnace method of making steel, as opposed to the openhearth method. The electric furnace can reduce beneficiated low-grade ores to steel in a single operation. It completely bypasses the coke oven and blast furnace, two basic and time-consuming steps in the openhearth method. Large amounts of coal will be utilized to generate electric power for the furnaces, or in the preparation of sinter from coke and ore.

5090 High-Purity Metals at Last. *Business Week*, Mar. 22, 1952, p. 133-134, 136.

Describes a purifying technique developed by National Research Corp. of Cambridge, Mass. A metal is melted in a high vacuum; this takes out the trapped gases and prevents the formation of oxides. At present, the process is important to the production of Ti and Zr. Later, it is believed that it will probably play a big part in the production of magnetrons.

5091* The Influence of Roasting Temperature Upon Gold Extraction by Cyanidation From Refractory Gold Ores. R. Carter and C. S. Samis. *Canadian Mining and Metallurgical Bulletin*, v. 45, Mar. 1952, p. 160-166; *Transactions of the Canadian Institute of Mining and Metallurgy*, v. 55, 1952, p. 130-136.

Presents a laboratory study of the above. Describes a method, using aqueous oxidation under high oxygen pressures, in which gold recovery from the calcines was over 98%. Photomicrographs, diagrams, and tables.

5092 Production of Titanium Ingots by Melting Sponge Metal in Small Inert-Atmosphere Arc Furnaces. W. E. Kuhn. *Journal of the Electrochemical Society*, v. 99, Mar. 1952, p. 89-96.

Two laboratory arc furnaces are described in detail. Satisfactory melting of Ti sponge in the inert-atmosphere arc furnace using nonconsumable electrodes is limited to sponge low in $MgCl_2$, because the presence of entrained chloride causes spattering of the molten Ti onto the electrode tip, and contamination of the melt by the electrode material. 16 ref.

5093 Development of Graphite Electrodes and Study of Heat Losses With Different Electrodes in the Single Electrode Inert-Atmosphere Arc Furnace. W. E. Kuhn. *Journal of Electrochemical Society*, v. 99, Mar. 1952, p. 97-108.

A Ti-TiC coated graphite-tipped electrode was developed for melting Ti without excessive C pickup. The principles evolved from the melting Ti and Zr may be extended to the development of graphite tips coated with other carbide-forming elements. The effects of varying arc length, arc current, and arc voltage on the steady-state heat losses in the cooling water supplied to the electrode, crucible walls, and crucible bottom were studied. Tungsten-tipped electrodes exhibited more efficient arc melting characteristics than graphite tips. Includes tabular and graphical data.

5094* The Production of Pure Cerium Metal by Electrolytic and Thermal Reduction Processes. *Bulletin of the Institution of Mining and Metallurgy*, Mar. 1952; *Transactions*, v. 61, pt. 6, 1951-52, p. 289-298.

Discussion of above paper by P. M. J. Gray (Jan. 1952 issue.)

5095 Production of Steel by the Oxygen-Impingement Process. Th. E. Suess. *Iron and Steel Engineer*, v. 29, Mar. 1952, p. 91-93. (Translated from Yearbook of the United Austrian Iron and Steel Works (Voest), Linz, Austria.)

Describes and illustrates process in which pure oxygen is blown down onto the bath in a converter-like vessel. Lists operative experiences obtained. Claims that the process refines pig iron so that blown steel needs no deoxiding additions, and that it is cheaper than the usual openhearth process.

2. *Metals—Smelting, Reduction, and Refining*

5096 Joint Discussion on the Papers—Full-Scale Blast-Furnace Trials, by J. A. Bond and T. Sanderson; Distribution of Materials in the Blast-Furnace. Part III. Further Factors Influencing the Distribution of Solids in the Blast-Furnace, by R. Wild. *Journal of the Iron and Steel Institute*, v. 170, Mar. 1952, p. 256-260.

Papers published respectively in May and Dec. 1951 issues.

5097 Joint Discussion on the Papers—Symposium on Stresses in Moulds: Ingot Heat Conservation; Ingot Mould Temperature Measurements, by R. T. Fowler and J. Stringer; Ten-Ton Ingot Moulds: Comparison of Design and Conditions of Use, by A. Jackson. *Journal of the Iron and Steel Institute*, v. 170, Mar. 1952, p. 226-231.

Papers published in Mar. 1951 issue.

5098 Joint Discussion on the Papers—The Production of High-Purity Iron Alloys on A 25-lb Scale, by B. E. Hopkins, G. C. H. Jenkins, and H. E. N. Stone; Tensile and Impact Properties of Iron and Some Alloys of High-Purity, by W. P. Rees, B. E. Hopkins, and H. R. Tipler. *Journal of the Iron and Steel Institute*, v. 170, Mar. 1952, p. 243-248.

Papers published respectively in Aug. and Oct. 1951 issues.

5099 Discussion on the Paper—The Present Position of the Converter Process: Economic Comparison With Other Steelmaking Processes, by B. Matuschka. *Journal of the Iron and Steel Institute*, v. 170, Mar. 1952, p. 260-261.

Paper published in May 1951 issue.

5100 Projecting and Depressed Crazing of Ingot Moulds; A Microscopical Examination at the Inner Surfaces of 10-Ton Moulds. R. E. Lismer and F. B. Pickering. *Journal of the Iron and Steel Institute*, v. 170, Mar. 1952, p. 263-267.

Two 10-ton ingot molds, representative of the projecting and depressed types of crazing on the inner surfaces, which were associated with short and long tap-to-strip times respectively, were examined. Concludes that projecting crazing results from growth at the inner surface and from the development surface, growth being of subsidiary importance. Photomicrographs.

5101 Factors Affecting Open-Hearth Productivity. W. G. Cameron and A. I. Aitken. *West of Scotland Iron and Steel Institute Journal*, v. 58, 1950-51, p. 65-145; disc., p. 145-171.

Discusses firing with rich and lean fuels, the various types of refractory and their characteristics, and the fundamentals of openhearth furnace design. Aspects of checkerwork are discussed and the methods of calculation are indicated. Some attention is then given to reversing valves and flues. The all-basic furnace is reviewed at some length and some notes are given on waste-heat recovery. 21 ref.

5102 Ensley's High Pressure Turbo-Blowers Increase Production, Decrease Coke Rates. J. J. Shannon. *Journal of Metals*, v. 4, Apr, 1952, p. 369-376.

Discusses improvement in efficiency of blast-furnace operation through installation of Ensley high-pressure, 5-stage turbo-blowers. Graphs and tables.

5103* Recovery of Nickel & Zinc From Silver Refinery Waste Liquors. Part I. Recovery of Nickel by Electro-Deposition. N. G. Banerjee and T. Banerjee. *Journal of Scientific & Industrial Research*, v. 11B, Feb. 1952, p. 76-78.

Tables and graphs.

5104* Pipes in Cast Steel Ingots and Pieces. (In French.) Lasare Quincy. *Métallurgie et la Construction mécanique*, v. 83, Dec. 1951, p. 971, 973, 975, 977; v. 84, Jan. 1952, p. 13, 15-17, 19.

Discusses the above with respect to killed and rimmed steels and the use of hot tops as a remedy. 2nd part discusses prevention by electrical heating of the feedheads. Includes photographs, micrographs, and macrographs.

5105* Why Should An Openhearth Furnace Be Blown? (Concluded.) J. E. Lafon. *Metallurgie et la Construction mechanique*, v. 83, Jan. 1952, p. 47, 49-51.

Discusses burner research, effects of symmetry of the air and gas ports, valves and regulators, and pros and cons of use of blowers.

5106 European Experiments on Vacuum-Melted Pure Iron. Tom Bishop. *Metal Progress*, v. 61, Apr. 1952, p. 75-81.

Describes the melting process and the effect of alloying elements on mechanical properties of iron. Diagrammed and illustrated.

5107 Refining Steel With Oxygen. Franz Rapatz. *Metal Progress*, v. 61, Apr. 1952, p. 94.

Describes process by which molten iron is blown with oxygen to make steel without any external source of heat. Gives advantages of the system.

5108* Reactions in the Muffle of a Zinc Furnace. (In Polish.) A. Krupkowski and J. Sosin. *Prace Glownego Instytutu Metalurgii*, v. 3, no. 6, 1951, p. 437-461.

During the reduction of Zn, a number of chemical reactions take place in the muffle of a furnace between carbon and the compounds of Zn, Pb, Fe, Cu, Cd, Sn, etc. The composition of gas evolved from the Zn dust is used as basis for calculation of direction and intensity of above reactions at 1200°K. Conclusions are summarized in English. Data are extensively tabulated and charted.

5109* Investigations of the Solidification of Duralumin in a Water-Cooled Sheet-Iron Ingot Mold. (In Polish.) M. Schneider and E. Zalesinski. *Prace Glownego Instytutu Metalurgii*, v. 3, no. 6, 1951, p. 491-500.

Presents results of above investigation. The process takes place in 2 stages, loss of heat by radiation and the solidification process in the interior of the ingot. Presents diagram for the process and recommendations for rate of cooling.

5109a Refining of Aluminum-Silicon Alloys. (In French.) Louis Grand. *Revue de l'Aluminium*, v. 29, Jan. 1952, p. 5-15.

Modification of the texture of Al-Si alloys caused by alkali metals or their fluorides leads to an important improvement in the mechanical characteristics of these alloys. Grain refining which occurs during a limited period of time can be obtained at any temperature ranging from about 720 to 820°C. In the particular case of high-Si alloys, phosphorus causes a lasting structural modification and the metal is more easily machined than if it had been refined with alkali metals.

5110* Role of Hydrogen in Blast Furnaces and Its Effects. (In French.) J. G. Platon. *Revue de Métallurgie*, v. 49, Feb. 1952, p. 125-128.

Discusses thermodynamic equilibria in the blast furnace; oxidation in the blast tuyeres; direct reduction in the crucible; necessity for combustion of hydrocarbons in the blast; injection of fuel; the general problem of fuel requirements; and role of O_2 and H_2 in the blast furnace.

5111* Study of Oxygen Injection in an Openhearth Furnace Using Coke Oven Gas as Fuel. G. Husson and J. Donney. (In French.) *Revue de Métallurgie*, v. 49, Feb. 1952, p. 145-163.

Describes, diagrams, and illustrates above furnace and equipment provided for oxygen injection. Extensive operating data are tabulated and discussed.

5112* Experiments on Production of Basic Bessemer Steels Having Low Nitrogen and Phosphorus Contents. (In German.) Karl Mayer, Helmut Knüpple, and Heinz Pottgiess. *Stahl und Eisen*, v. 72, Feb. 28, 1952, p. 225-232.

Describes, diagrams, and illustrates a German plant located in Dortmund. Includes method of blowing with O_2-enriched air and with O_2-CO_2 mixtures, also of application of elevated pressures. Describes effect of N_2, P, and O_2 on embrittlement susceptibility of low N and P steels. Data are extensively charted and tabulated. 12 ref.

5113* Possibilities for Improvement of Basic Bessemer Steel by Adding Oxygen to the Blast. (In German.) Walther Dick. *Stahl und Eisen*, v. 72, Feb. 28, 1952, p. 233-242.

Presents results obtained for a large number of basic Bessemer heats blown with O_2-enriched air. Includes composition data; correlations between N_2 and P content and between P and O_2 content; segregation and nonmetallic inclusions; cropping and surface finishing of ingots; drawability and workability of wire made from aged Bessemer steel; results of notched-bar impact tests and bending tests; weld-deposition tests; and

remagnetization losses for transformer sheets made from this steel.

5114* Manufacture of Basic Bessemer Steel by Addition of Limestone Splinters and Oxygen. (In German.) Walter Bertram. *Stahl und Eisen*, v. 72, Feb. 28, 1952, p. 243-245.

Describes manufacture of air-refined steel from basic Bessemer pig, without preliminary ladle refining, as a substitute for open-hearth steel. Limestone is added after combustion of Si. Two min. later, fluorspar-free ore is added in lumps. From the 6th to the 12th min., O_2 is added up to a maximum of 35%. Application for deep-drawing sheet and strip is discussed.

5115* Melting Stainless Steel in the Electric-Arc Furnace and Its Refining With Oxygen. (In German.) Karl Bungardt, Edmund Pakulla, and Kurt Tesche. *Stahl und Eisen*, v. 72, Feb. 28, 1952, p. 245-255.

Describes experimental heats in a 300-kg. furnace, also results of production heats in 10-, 20-, and 30-ton furnaces. Discusses efficiency and working pressure of O_2; stability of metallic oxides; temperature dependence of the Cr/C equilibrium; decarburization rate; oxygen consumption; carbon content before refining; life of oxygen-inlet tubes and of refractory linings; power savings; and workability of the steel produced. Tables and graphs. 27 ref.

5116 Blast Furnace Practice. VI(d). Generation, Recovery and Use of Heat. VII. Comparative Values of Fluxing Stones. VIII. Slag Composition Research. IX(a). The Raw Materials Problem. Charles E. Agnew. *Steel*, v. 130, Mar. 17, 1952, p. 98, 100, 103, 106, 109-110; Mar. 24, 1952, p. 90, 93-94; Mar. 31, 1952, p. 86, 88, 90, 92, 95; Apr. 7, 1952, p. 121-122, 124, 126, 129, 132, 134, 137-138.

Shows how the existence of a high-temperature zone in every blast-furnace operation causes a carbon-solution loss reaction. Carbon in the form of CO can be returned to the furnace as blast heat. Part VII presents a comparison of operating conditions in Southern and Eastern areas of the U. S., which indicates that economy of calcite and dolomite fluxes is determined by the need for their chemical constituents, and not alone by SiO_2-CaO ratio. Part VIII shows that a combination of furnace reactions and disclosures on slag-mineral compositions is of greater value than any other for visualizing thermal conditions within the furnace. Findings of various investigators are reviewed. Part IX (a) shows how development in the art of producing Fe in a blast furnace has advanced with better understanding of raw-material properties and their effects on operating economy. (To be continued.)

5117* Behavior of the Nobler Metals During Refining of Aluminum According to the Triple-Layer Process. (In German.) G. Grube and P. Hantelmann. *Zeitschrift für Elektrochemie Bericht der Bunsengesellschaft für physikalische Chemie*, v. 56, Jan. 1952, p. 1-8.

Describes experiments on measuring the potentials of anodic solution of Mn, Si, Zn, Fe, Cu, and Ag in the electrolyte used for refining of Al, as a means of developing a method for refining Al scrap and Al-rich alloys. The high vapor pressure of Zn at the test temperature (850°C) is shown to be the reason why small concentrations of Zn pass into the cathode aluminum. Includes tables and graphs.

5118* Electrolysis of Molten Cuprous Chloride. (In German.) Paul Drossbach. *Zeitschrift für Elektrochemie Berichte der Bunsengesellschaft für physikalische Chemie*, v. 56, Jan. 1952, p. 23-31.

Discusses theoretical studies and experiments on current yields and polarization potentials under different conditions. Diagrams, graphs, tables, and photographs are presented.

5119* Electrolysis of Nickel Chloride. (In German.) Paul Drossbach. *Zeitschrift für Elektrochemie Berichte der Bunsengesellschaft für physikalische Chemie*, v. 56, Jan. 1952, p. 31-35.

Discusses method of determining current yields and polarization potentials in electrolysis of $NiCl_2$ mixed with molten NaCl + KCl. Concentration polarization resulting from diffusion is theoretically analyzed.

5120* Autogenous Smelting of Sulfidic Copper Ores; Production of Iron From Iron Silicate Slags of Copper Smelting Furnaces. (In German.) Petri Bryk. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 4, Dec. 1951, p. 447-450.

Describes special type of copper smelting, developed because Finland has no cheap electric power at its disposal since the Second World War, and no domestic fuel either. Details of process are indicated, also a new closely related process for the production of iron and steel.

Miscellaneous Publications

5121 Contribution to the Metallurgy of Chromium in the Basic Steel-Making Processes. E. Plockinger. Henry Brutcher, Translation 2816, 41 pages. (From *Archiv für das Eisenhüttenwesen*, v. 22, Sept.-Oct. 1951, p. 283-293.)

Previously abstracted from original.

5122 Single-Crystal Structure of Skull Removed From an Openhearth Bottom. H. Krainer. Henry Brutcher, Translation 2739, 3 pages. (From *Berg- und Hüttenmännische Monatshefte*, v. 92, no. 1-3, 1947, p. 55-56.)

Presents results of metallographic and X-ray analyses on the above. Gives an explanation of conditions under which this single crystal could have developed and remained intact.

5123 Removal of Magnesium and Magnesum Chloride From Titanium by Vacuum Distillation. M. A. Cook and F. S. Wartman. U. S. Bureau of Mines, Report of Investigations 4837, Feb. 1952, 17 pages. (TN21 Un3r)

A method of vacuum purification is described in which the crude mixture is heated in a vacuum at about 1700°F. and the Mg metal and chloride volatilized away from the Ti, leaving it practically Mg-free in a sponge-metal form. The pilot-plant equipment is described in detail, together with the technique of operation and methods of sponge recovery. Operating data are given; and power and labor requirements are discussed.

5124 Manganese Concentrates From Open-Hearth Slags by Lime-Clinkering (Sylvester) Process. John A. Ruppert. U. S. Bureau of Mines, Report of Investigations 4847, Feb. 1952, 26 pages. (TN21 Un3r)

It has been proposed that addition of enough limestone to an openhearth slag to give a $CaO \cdot 3P_2O_5/SiO_2$ ratio of approximately two, followed by firing in an oxidizing atmosphere under proper conditions of time and temperature, will result in a clinker having a magnetic phase containing a preponderance of Mn, Fe, Al, and Mg as oxides and a nonmagnetic phase consisting for the most part of a phosphorus-containing dicalcium silicate. It has been postulated further that the metal oxide phase can be recovered by fine grinding and magnetic separation. These broad principles have been substantiated by numerous clinkering operations made in an electrically fired studio-type kiln, a batch rotary kiln, and a continuous rotary kiln, and by magnetic separations in a Davis-tube separator and a laboratory-size Jeffrey-Steffensen 3-roll continuous separator. Apparatus is diagrammed and illustrated; data are charted.

Books

5125 The Making, Shaping, and Treating of Steel. Ed. 6. J. M. Camp and C. B. Francis. 1584 pages. 1951. U. S. Steel Co., Pittsburgh, Pa. (TN730 C15m6)

Presents a compilation of past and present practices in the iron and steel industry. Numerous quotations, photographs, drawings, charts, and tables. Chapter references.

5126 Surface Defects in Ingots and Their Products. (Recommended Definitions). 51 pages. Aug. 1951. Iron and Steel Institute, London. (TN601 I6s)

Defines and illustrates the above.

See also:

5055 (Ti and Fe production in Quebec)
5158 (vacuum refining)
5197 (production of ferrosilicon)
5395 (solidification of steel ingots)
5760 (process controls in the steel mills)
5829 (sponge Cu from pickling wastes)
5936 (refractories for blast furnaces)
5950 (melting ferrous and nonferrous metals)
6118 (reduction of NiO by H_2)
6120 (ion-exchange separation of Ti, Zr, and Th)
6159 (rare earth-metal production)

3. FOUNDRY PRACTICE

5127 Bonding Material For Small Castings; Surface Tension Bonds For Sand. W. A. Snyder. *American Foundryman*, v. 21, Mar. 1952, p. 38-41.

Outlines and discusses experiments in an investigation to produce molding-sand mixtures with suitable combinations of strength, permeability, and deformation for light molding, using only the surface tension of a fluid as a binder.

5128 Pressure Casting Aluminum. *American Foundryman*, v. 21, Mar. 1952, p. 45-48.

Describes and illustrates operations at Scientific Cast Products Co., Cleveland and Chicago, for making cast Al patterns and matchplates.

5129 Magnesite For Molding. S. G. Urane. *American Foundryman*, v. 21, Mar. 1952, p. 49-50.

Results of job-tested experiments show that magnesite can replace silica flour as a general mold and core wash and in treating facing sand to reduce its permeability. Tells how to prepare the magnesite; describes properties, compounding techniques, and application methods for the wash; gives typical facing-sand mixtures; and offers helpful suggestions on sound practice.

5130 Clay Determination Procedure Improved; Testing Sand With Included Combustibles. *American Foundryman*, v. 21, Mar. 1952, p. 59.

The standard siphoning procedure for determining A.F.S. clay does not distinguish between mineral and combustible matter such as wood flour, cereal, and sea coal. The test detailed here, however, determines clay in the presence of such organic material and is thus well suited for used molding sand.

5131* Core Removal and Cleaning of Castings by the Wet Process. W. Russell. *British Cast Iron Research Association Journal of Research and Development*, v. 4, Feb. 1952, p. 263-268; disc., p. 268-271.

Describes in some detail the plant and equipment required, and the method of charging the castings into the cleaning chamber. A typical analysis of the blast sand, the molding sand, and reclaimed sand is given, and finally there is a brief description of the water-reclamation plant. Illustrated.

5132* Some Experience With Cupola Spark and Dust Arresters. W. Y. Buchanan. *British Cast Iron Research Association Journal of Research and Development*, v. 4, Feb. 1952, p. 272-279; disc., p. 279-282.

Considers various types of impurities given off from cupola stacks. Outlines the development and improvements in the design of wet spark arresters which have taken place in recent years, chiefly in America. In an early design of arrester, accelerated corrosion of the pipes took place due to concentrations of sulfur compounds in the circulated water. Means of minimizing the corrosion problem are described.

5133 Foundry Mechanization. Part 2. A. S. Beech. *Canadian Metals*, v. 15, Mar. 1952, p. 34, 36, 39.

Describes several British innovations that have been thoroughly tested in U. K. foundries. Presents thoughtful criticism of American technique.

5134* Size Classification and Permeability of Foundry Sands. (In French.) Philippe Jasson. *Fonderie*, v. 73, Feb. 1952, p. 2795-2804.

Discusses calculation of the theoretical specific surface of a sand, determination of its fineness-permeability relation, experimental verification of this relation, and some of its practical applications. Inch des tables and charts.

5135 Nickel-Base Nonferrous Castings. James Vanick. *Foundry*, v. 80, Apr. 1952, p. 94-97, 257-258, 260-261.

Discusses the production, composition, properties, corrosion resistance, and welding of Ni-base casting alloys. Graphs, illustrations, and tabular data.

5136 Experimental Production of Nodular Graphite in Cast Iron. Alexander I. Krynitsky and Harry Stern. *Foundry*, v. 80, Aur. 1952, p. 98-99, 241, 243-244, 246-247, 249.

Deals with the effect of treatment with FeS, B, MgO, magnesite, Ca and Ni-Cr-Mo on the graphite structure of cast iron. Photomicrographs and tabular data. 17 ref.

5137 Gates and Heads for Steel Castings. John Howe Hall. *Foundry*, v. 80, Mar. 1952, p. 112-115, 257-258; Apr. 1952, p. 104-107, 255-257.

Use of the Washburn or necked-down head is described. Also discusses center-line shrinkage in steel castings and methods of securing directional solidification. Tells how to employ padding and metal chills in order to obtain directional solidification of steel castings. 29 ref.

5138 Moulding in an Indian Foundry. S. G. Athanikar. *Foundry Trade Journal*, v. 92, Mar. 13, 1952, p. 271-277.

Describes and illustrates equipment and procedures for production of large iron sand castings.

5139 Further Mechanical Aids for the Foundry. A. S. Beech. *Foundry Trade Journal*, v. 92, Mar. 13, 1952, p. 279-283; Mar. 27, 1952, p. 331-335. (A condensation.)

In a paper presented to the Institution of Mechanical Engineers in 1942, trends of mechanization in foundries were fully described. In this paper, innovations that have taken place since that date are discussed, with special reference to the mass-production plant of British Railways at Hodwich; light, medium, and heavy foundries; and strides that have been made in semimechanization of the jobbing foundry.

5140 Discussion on Cupola Practice. *Foundry Trade Journal*, v. 92, Mar. 13, 1952, p. 286-287, 290.

Presented at recent meeting of East Midlands branch, Institute of British Foundrymen.

5141 Experiences With the Investment Casting Process. D. F. B. Tedds. *Foundry Trade Journal*, v. 92, Mar. 20, 1952, p. 297-310.

Briefly discusses possibilities and limitations of the above. Gives detailed examples of special components for which it has been adapted on an experimental basis, covering burner stems, pitot combs and tubes, and combustion chambers for turbine engines. Considers such production aspects as injection dies, wax-pattern production, molding and investing, secondary investment, alternative bonds, compacting, drying and firing, high-temperature oven, casting, and inspection and technical control. Tabular data on defects. Numerous photographs.

5142 Swarf Melting in the Cupola. *Foundry Trade Journal*, v. 92, Mar. 20, 1952, p. 313-314.

Presents details of 2 methods of the above as a conservation measure, one being to charge swarf as it comes from the machine shops directly into the cupola. The 2nd method consists of first briquetting the swarf by mixing with cement and allowing it to harden into blocks before charging to the cupola. The 1st method was adopted because it is cheaper, although it has a higher melting loss.

5143* The Sand-Block Casting Process. (Flaskless Casting Process.) (In German.) R. Weidner. *Giesserei*, v. 39, Jan. 24, 1952, p. 25-29.

Gives details of production of metal patterns for the above. Advantages of method are indicated and production figures tabulated. Possibilities of application are shown by examples taken from foundry practice. Photographs.

5144* Grain Formation in Steel Produced in Small Converters and Its Annealing. (In German.) F. Roll. *Giesserei*, v. 39, Jan. 24, 1952, p. 30-31.

Discusses effects of various factors on the above, especially composition and annealing temperatures.

5145* Preliminary Work on the Commercial Production of Cast Iron With Nodular Graphite in Poland. (In German.) *Giesserei*, v. 39, Jan. 24, 1952, p. 31-32. (From *Przeglad Odlewnictwa*, v. 1, no. 1, 1951, p. 3-4.)

Outlines the above. Includes photomicrographs.

5146* Working With Synthetic Molding Sand. (In German.) H. Herschenz. *Giesserei*, v. 39, Feb. 7, 1952, p. 54-56.

Shows that synthetic molding sand mixed with 0.75-1.5% bentonite and 6-7% water yields fully satisfactory castings. Data are graphed and tabulated.

5147* Centrifugal Casting. (In Swedish.) H. Jungbluth. *Gjuteriet*, v. 42, Jan. 1952, p. 1-10.

Mathematical and physical laws of centrifugal casting are discussed. After a short historical review, the practical aspects of centrifugal casting of tubes, cylinder linings, and other tubular goods are discussed. Numerous diagrams, graphs, photographs, and micrographs.

5148 Machine Makes Cores Faster, Cheaper, Better. Herbert Chase. *Iron Age*, v. 169, Mar. 27, 1952, p. 93-97.

Shows how complex cores can be rammed better, faster, and at lower cost in a new automatic coremaking machine in use at Buick. Only hand operations left are inserting wires where needed, putting driers in place, and transferring driers with cores to the baking-oven conveyer. Boxes, which may be cast iron or Al, are not touched by hand. 5 table stations index smoothly through 5 stations. A modified Geneva indexing motion helps avoid shocks in accelerating and decelerating.

5149* Fundamental Study of Precision Casting. I. Experiments on Bronze Casting. (In Japanese.) Kazuo Katori, Tsuneyuki Okakura, and Yotaro Shindo. *Journal of Mechanical Laboratory*, v. 5, Nov. 1951, p. 312-319.

The lost-wax process was studied. Several beeswax patterns cast in a $CaSO_4$ mold were investigated. Coating and investment materials were natural and heat-treated silica sands. Bonding material was a solution of hydrolyzed ethyl silicate. A standard gunmetal was poured.

5150* The Osborn-Shaw Process of Precision Casting. *Machinery* (London), v. 80, Mar. 20, 1952, p. 506-507.

The above has been experimentally developed and tested over a period of 5 years by Shaw Processes, Ltd., Newcastle-upon-Tyne, and has been employed for full-scale commercial production in a specially-equipped precision foundry. Work already undertaken has included the casting of machine parts to an accuracy of 0.005 in.; and production of dies for die casting, stamping, forging and extrusion; and for glass, rubber, and plastics. Materials already cast with success include Al and Mg alloys, brasses and bronzes, Fe, carbon steel, stainless steel, high-alloy steels, Stellite, Vitallium, and tungsten hard-facing alloys.

5151 Degassing With Lithium. *Metal Industry*, v. 80, Mar. 7, 1952, p. 191-192.

Describes experiments made in order to obtain a more efficient and reliable method of degassing Cu and Ni alloys under existing melting conditions, and cleaner metal after deoxidation. One of the several findings of this investigation was the possibilities and merits of the use of Li metal. It was found that the best average addition was 0.005% Li added immediately before casting and after deoxidation had been carried out with 0.08% Mg. The alloys treated and notes on the type of casting regularly produced are listed.

5152* Research on Segregation in High-Strength Mg-Al Alloys. (In German.) G. Siebel. *Metall*, v. 6, Feb. 1952, p. 64-69.

Describes development of the forgeable Mg alloys AZ855 (7.0-7.5% Al, 1.0-1.5% Zn, 0.1% Mn); and shows that these alloys can be forged most economically when cast by the continuous process in which most nonmetallic and excess metallic compounds are segregated. Includes photographs, photomicrographs, diagrams, and tables. 10 ref.

5153* Experiences and New Information Concerning Aluminum Chill Casting. (In German.) Gustav Lauterjung. *Metall*, v. 6, Mar. 1952, p. 129-133.

Reviews the above, giving examples in precision casting and the casting of bulky pieces. Several examples are illustrated; data are charted.

5154 Use of Machine-Poured Pig Iron. Remelting Tests on Hematite Pig Iron Cast in Sand and Automatically. (In Italian.) A. Scortecci, W. Demicheli, M. Drufuca, and A. Palazzi. *Metallurgia Italiana*, v. 44, Feb. 1952, p. 55-72; disc., p. 72.

Automatic pouring of pig iron, its advantages and disadvantages, were investigated. Discusses methods and results of experiments carried out on a commercial scale in a blast furnace and in a cupola to compare mechanical properties and microstructures of cast iron obtained from 2 kinds of pig iron differing only in the method of pouring. Includes tables, micrographs, charts, and diagrams. 16 ref.

5155 The Impending Revolution in Casting Processes. H. H. Harris. *Metal Progress*, v. 61, Mar. 1952, p. 65-69.

Deals with developments in the arts and sciences in "casting" of metals and their possible and probable benefit to defense and the national economy. Discusses dimensional accuracy, chemistry-structure relationship, and tooling for improved quality and quantity with respect to the need for elevating the casting industry to higher levels of application and service.

5156 An Appraisal of the Shell Molding Process. Harold J. Roast. *Metal Progress*, v. 61, Apr. 1952, p. 71-74.

Describes the process, general requirements, molding and casting procedure.

5157* Production of Quality Cast Tools. (In Russian.) P. S. Pershin and B. A. Alekseev. *Stanki i Instrument*, v. 22, Aug. 1951, p. 22-25.

The casting of special high-speed-steel tools is described and discussed.

5158 Vacuum Metallurgy; Its Characteristics and Its Scope. W. J. Kroll. *Vacuum*, v. 1, July 1951, p. 163-184.

The actual and potential uses of vacuum methods in metallurgy are discussed. Surveys existing furnace designs, their performance, and limitations. Describes a large variety of metallurgical procedures, where the application of vacuum would appear to offer advantages. Melting and separation of metals are emphasized; however, considerable attention to vacuum processing of inorganic compounds is also given. 88 ref.

5159* Contribution to the Production of Cast Iron With Spheroidal Graphite. (In German.) Borut Marincek. *Von Roll Mitteilungen*, v. 10, June-Dec. 1951, p. 14-44.

Following a discussion of the reactions taking place in molten cast iron, experiments in the production of nodular cast iron, by addition of pure Mg, are described and discussed. The mechanical properties of cast iron thus produced correspond with the known properties of nodular cast iron. The formation of nodular graphite and differences in the forms of graphite in cast iron are explained in terms of the surface tension of molten cast iron. Includes graphs, tables, diagrams, and photomicrographs. 25 ref.

Book

5160 Centrifugal Casting by the Cire Perdue Process. C. Rosen. 204 pages. 1949. Contact Publications, Ltd., London. (TS740 R72c)

Attempts to collate all the available information concerning jewelry castings supported by the researches of the technical experts in the service of manufacturing firms, research laboratories and jewelers. Although the work was compiled primarily to introduce investment casting to the manufacturing jeweler, the information is believed to be of equal value to the dental and industrial caster, provided the difference in required accuracy and finish is taken into account. Numerous tables, diagrams, and illustrations.

See also:
5115 (arc melting of stainless steel)
5387 (porosity in light-metal castings)
5461 (gray iron produced in basic cupola)
5487 (arc casting of Mo)
5803a (castings in engineering design)
6012 (design of iron castings)
6013 (design of iron castings)

4. METALS—PRIMARY WORKING

5161* Calculation of Intermediate Measurements When Drawing on Multiple Drawing Machines. (In German.) Karl Schemmer. *Archiv für das Eisenhüttenwesen*, v. 22, Nov.-Dec. 1951, p. 367-370.

Describes 3 main types of above equipment, and tells how to make the necessary calculations. Includes graphical interpretation.

5162* The Manufacture of Seamless Steel Tubing in Australia. J. Porteous. *Australasian Institute of Mining and*

4. *Metals—Primary Working*

Metallurgy, Proceedings, new ser., Mar. 31-June 30, 1947, p. 181-203.
Outlines important processes. Shows the essential differences between the various methods of rotary and non-rotary piercing, with their accompanying processes of elongation. Principles of the push-bench process are sketched.

5163* Production and Metallurgical Characteristics of Hollow Mining Drill Steel in Australia. Daniel Clark. *Australasian Institute of Mining and Metallurgy, Proceedings*, new ser., Mar. 31-June 30, 1947, p. 205-233.

Includes historical background, manufacture, heat treatment, fatigue failures, and consideration of the establishment of a central testing station. Illustrations and photomicrographs. 19 ref.

5164 Does New Process Challenge Foundries? Lorne Frame. *Canadian Metals*, v. 15, Mar. 1952, p. 28-29.

Describes cored forging and pressing, described as bridging the gap between sand and die casting. The process is said to be able to do jobs which can't be done by sand casting and do better some jobs which can be done by sand casting. The process is of potential importance to manufacturers of aircraft parts, valve and plumbing fixtures, automobiles, gears, fire-fighting equipment, fuse components, lock hardware, electrical fittings, and many others.

5165 History of Aluminum-Alloy Casting. *Foundry Trade Journal*, v. 92, Mar. 6, 1952, p. 251-254.

Discussion of above paper by A. P. Fenn. (Feb. 28 issue.)

5166 Precision Control Speeds Shell Production. W. G. Patton. *Iron Age*, v. 169, Apr. 3, 1952, p. 127-131.

Describes production of artillery shells at Chevrolet's St. Louis plant, starting with the carbon-steel billets through packaging of shells for shipment. Operations include hot forging, rough and finish turning, nosing, finish grinding, welding and painting.

5167 High Temperature—High Speed Heating for Steel Rounds. A. F. Kritscher. *Iron and Steel Engineer*, v. 29, Mar. 1952, p. 55-60; disc., p. 60-62.

Describes application of principles of high-speed heating to new types of heating units, used prior to the seamless tube-making process, for economy in heating and better quality of product. A number of new heating principles have been developed. Describes new barrel-type furnace of National Tube Div., U. S. Steel Co. Heating-rate graphs for stainless and carbon-steel rounds are presented.

5168 Operating and Economic Aspects of High Speed Tandem Cold Reduction Mills. F. K. Schefe. *Iron and Steel Engineer*, v. 29, Mar. 1952, p. 103-107; disc., p. 107-108.

A general discussion of the above as applied to sheet-steel production.

5169* Modern Metallurgical Trends in the Production of Steel Plates. W. Barr. *West of Scotland Iron and Steel Institute Journal*, v. 58, 1950-51, p. 1-10.

Presidential address discusses above trends. Outlines present status with respect to compositions, mechanical properties, and fabrication methods. Use of a low-alloy, high-tensile, weldable steel seems to be the trend, in order to obtain required properties plus a substantial reduction in plate thickness.

5170* Production of Bolts and Nuts. A. P. Newall. *West of Scotland Iron and Steel Institute Journal*, v. 58, 1950-51, p. 49-62; disc., p. 62-64.

Reviews the development of mass-production methods of bolt-and-nut manufacture, especially by cold upsetting or hot forging. Some comments are made on physical and metallurgical characteristics required. Application of high-frequency heating in forging and heat treatment is mentioned.

5171 Defects in Rolled Products. *Metal Progress*, v. 61, Mar. 1952, p. 98, 100, 102, 104. (From Report No. 193, Subcommittee on Rolling, *Verein Deutscher Eisenhüttenleute*, by Paul Grüner and T. Brüggeman.)

Identifies and groups defects into: material defects which originate in the melting shop; defects which arise in the rolling mill, and defects which can be remedied through a definite heat treatment in the rolling mill.

5172 Steel Extruding Puts the Squeeze on Conventional Forming. H. J. Altwicker and K. F. Braeuninger. *Steel*, v. 130, Mar. 17, 1952, p. 88-90.

Describes a versatile extrusion process which produces a variety of shapes with no more than a change of dies. A comparison of mechanical properties of some extruded and rolled materials is given.

5173 The Manufacture and Use of Fourdrinier Wire Cloth. A. G. Hose and J. P. Johnson. *Wire and Wire Products*, v. 27, Mar. 1952, p. 249-254, 313.

Describes the exacting requirements of this specialized type of wire and the product into which it is made. Alloys used are phosphor bronzes with 7-8% Sn, 0.2-0.3% P, balance Cu.

See also:
5114 (Bessemer steels for deep drawing)
5125 (fabrication of steel—book)
5152 (forging high-strength Mg-Al alloys)
5803a (forging vs. welding)

5. METALS—SECONDARY WORKING

5174* Oxygen Cutting During Preparation of Welded Structures for Building Construction. (In Russian.) M. M. Sakhovskii. *Avtogennoe Delo*, v. 22, July 1951, p. 19-22.

Experiments were made on the influence of oxygen cutting on the properties of edges and welded joints. A universal pattern for semiautomatic cutting is described and illustrated. Deformation during cutting, preparation of edges, and organization of working area are discussed.

5175 Evaluating Machinability of Rolled Steels, Forgings, Cast Irons. Michael Field and Norman Zlatin. *Canadian Metals*, v. 15, Apr. 1, 1952, p. 40-42.

Examples of procedures on several representative problems arising in industry are cited to illustrate the approach in evaluating machinability. Considers low-carbon steels with S added, medium-alloy carbon steels, automotive-steel forgings, and cast iron. Tabular data.

5176* Economic Aspects of Cutting Tool Life. H. J. Burmester. *Engineers' Digest*, v. 13, Feb. 1952, p. 45-49. (From *Werkstatt und Betrieb*, v. 84, Nov. 1951, p. 512-516.)

A thorough analysis of the above. Deals with economic implications of cutting-tool life rather than cutting conditions.

5177 New Machine Forms Jet Rings. *Iron Age*, v. 169, Mar. 27, 1952, p. 106-107.

New machine described and illustrated forms rings by taking partially preformed strip, sheet, or plate, putting it in tension between two jaws, then wrapping it around a die. Little or no finish machining is required. Varied shapes may be formed.

5178 Conserve Diamond Bort and Cut Hard-To-Machine Materials With New Machining Processes. *Journal of Metals*, v. 4, Apr. 1952, p. 378-380.

Describes and gives tabular data on new processes including electrolytic, electric-spark, electric-arc, and ultrasonic methods for shaping and finishing cemented-carbide tools and tungsten carbide projectile cores.

5179 Impact Extrusion of Magnesium. T. L. Patton. *Machine Design*, v. 24, Mar. 1952, p. 225-226, 228. (A condensation.)

Discusses advantages of above process over other processes such as drawing. Describes operations involved.

5180* Tools for the Impact Extrusion of Magnesium. George H. DeGroat. *Machinery* (American), v. 58, Mar. 1952, p. 162-167.

Describes tools and methods used in the above. Design details for various examples are given.

5181* Forming Sheet Metal With Low-Cost Tools. J. A. Whittingham. *Machinery* (American), v. 58, Mar. 1952, p. 186-191.

Flat sheet-metal parts with flanges, holes, and other irregularities are formed in hydraulic presses using a rubber pad and form blocks. Recent advances in this method of forming have considerably reduced secondary manual operations. Some of

these tooling improvements and an ingenious press arrangement employed in this process are described.

5182* The Lapping Process. (In German.) Hans H. Finkelnburg. *Metalloberfläche*, ser. A, v. 6, Jan. 1952, p. A9-A14.

Discussion on modern lapping practice and lapping machines includes diagrams, photographs, and graphs.

5183* Economical Cleaning by Grinding of Round Parts Before Galvanizing. (In German.) W. Hofman. *Metalloberfläche*, ser. B, v. 4, Jan. 1952, p. B1-B5.

Discusses and illustrates various efficient methods for the above.

5184* Methods of Investigating the Machinability of Metals. (In French.) Leon Czaplicki. *Revue universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliqués a l'Industrie*, ser. 9, v. 95, Feb. 1952, p. 33-43.

Discusses 3 possible types of chips, and presents a brief resume of the mathematical analysis of the cutting phenomenon made by Merchant. Different methods of investigation are reviewed. Includes micrographs, diagrams, and tables.

5185* Cutting Fluid Chemical Adheres to Metal. C. L. Davis. *Screw Machine Engineering*, v. 8, Apr. 1952, p. 60-61.

General Aniline and Film Corp. has developed a new type of coolant which is said to meet the 4 primary requirements of cooling the tools, providing good lubricity between cutting edge and workpiece, resisting rancidity, and providing good anti-rust qualities. Contains an entirely new active ingredient which possesses an extremely strong affinity for metal surfaces.

5186* Testing the Durability of Cutting Tools Without Use of Laboratory Cutting Machines. (In Russian.) M. N. Nikolaichik. *Stanki i Instrument*, v. 22, June 1951, p. 18-20.

A formula was developed for evaluating cutting tools on the basis of factory data. Results are discussed, tabulated, and charted.

5187* Liquid Abrasive Machining. (In Russian.) N. I. Goraetskii. *Stanki i Instrument*, v. 22, July 1951, p. 27-31.

Problems connected with the design and use of liquid abrasive machining are discussed. An experimental machine is described and diagrammed. Data are charted.

5188 Electrolytic Grinding: Stubborn Alloys Less Formidable. George Keeleric. *Steel*, v. 130, Mar. 17, 1952, p. 84-86.

Tells how the principles of removing stock by electrochemical action are applied successfully to the grinding of difficult-to-machine metals and metal carbides. Surface finish is excellent.

5189 Precision Spinning Solves Ticklish Forming Problem. Bernard Blackman. *Steel*, v. 130, Mar. 24, 1952, p. 68-69.

Describes and illustrates process by which perfect spherical segments for dials on aircraft gyro indicators are mass produced from Al by combining watchcase spinning techniques and die-stamping.

5190 Carbide Trepanning Accurate Bores in Record Time. Fred W. Lucht. *Steel*, v. 130, Mar. 31, 1952, p. 74-75.

Describes very rapid process which removes most of the inside diameter as a solid core instead of chips. Present boring machines can be converted for trepanning operations.

5191 Specialty Die Designs for Stamping and Forming. Part I. The Marform Process. Lester F. Spencer. *Steel Processing*, v. 38, Mar. 1952, p. 121-127.

Describes, diagrams, and illustrates application to miscellaneous ferrous and nonferrous metals and alloys. Recommended dimensions are tabulated.

5192* The Renaissance in Metal Cutting. Milton C. Shaw. *Technology Review*, v. 54, Mar. 1952, p. 245-247, 264, 266, 268.

Describes and analyzes research techniques for studying the metal-cutting process. Discusses tool wear, plastic deformation, and metallography.

5193 Electro-Mechanical Machining of Hard Materials. Malcolm F. Judkins. *Tool Engineer*, v. 28, Apr. 1952, p. 48-50.

Discusses conventional processes, and describes arc disintegration, electrolytic spark, and electromechanical machining and its applications.

5194 Basic Forming Techniques for the Copper Base Alloys. Part I. Lester F. Spencer. *Tool Engineer*, v. 28, Apr. 1952, p. 56-59.

Discusses the above and includes tabular data on composition; and on mechanical, physical, and fabrication properties. (To be continued.)

5195* Oxygen Cutting of Defense Equipment Materials. A. H. Yoch. *Welding Journal*, v. 31, Mar. 1952, p. 217-229.

Discusses the setting up of procedures or standards of control in order to secure the most satisfactory results for oxygen cutting of rolled alloy-steel plates, forgings, and castings on a production basis. Illustrations and tabular data.

Book

5196 Increased Production, Reduced Costs Through a Better Understanding of the Machining Process and Control of Materials, Tools, Machines. Vol. 2. 196 pages. 1951. Curtiss-Wright Corp., Wood-Ridge, N. J. (TJ1160 C94i)

The above concentrates on one aspect—the effect of microstructures of plain-carbon, alloy, and stainless steels on tool life. Includes a discussion of the effects of machining practice on residual stress and endurance limit. Recent developments in the machining of Ti and its alloys are given. Numerous micrographs, charts, and tables.

See also:
5125 (fabrication of steel—book)
5166 (artillery shell fabrication)
5239 (Russian developments in flame cutting)
5272 (machining of steel-microstructure effects)
6683 (survey of machine-tool industry)

6. POWDER METALLURGY

5197* The Manufacture of Tungsten Powder and Ferro-Silicon at the Works of the Broken Hill Pty. Co., Ltd., New Castle. I. H. Carne. *Australasian Institute of Mining and Metallurgy, Proceedings*, new ser., Mar. 31-June 30, 1947, p. 1-14.

Describes and discusses in detail all phases of the above, including properties and applications.

5198 Powder Metallurgy: A Review of the Literature and Recent Russian Work. *Chemical Age*, v. 66, Mar. 1, 1952, p. 345-347.

5199* The Sintering of Copper-Zinc Powder Compacts. D. D. Howat, R. L. Craik, and J. P. Cranston. *Journal of the Institute of Metals*, v. 80, Mar. 1952, p. 353-361.

It is shown that data obtained by differential thermal analysis, together with changes in volume and in electrical resistivity, may be taken as criteria of the sintering and alloying processes occurring when compacts of Cu and Zn powders are heated. Effects of particle size and compacting pressure on the mechanism were also investigated.

5200* Biaxial Pressing of Powdered Materials. (In Russian.) I. A. Leskovich. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Aug. 1951, p. 1230-1233.

The distribution of stresses in metallic and nonmetallic powder compacts is discussed in relation to composition and shape factors. Experimental data are discussed and charted for some organic and inorganic compounds.

5201 Sintered Titanium Carbide. Frank W. Glaser and W. Ivanick. *Journal of Metals*, v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 387-390.

A pressure-sintering method was used to produce binder-free and very dense TiC specimens. Some physical and mechanical properties of these TiC bodies were determined and found to compare favorably with those of certain cemented TiC grades. It was also observed that the hot transverse rupture strength of TiC bodies remained substantially the same regardless of the amount or type of binder material used.

6. *Powder Metallurgy*

5202* Continuous Quality Control in Hard-Metal Production. (In German.) H. Franssen. *Metall*, v. 6, Jan. 1952, p. 12-21.

Reviews and tabulates the above on the basis of the literature, organizing the data according to composition of the materials, which include ceramics, carbides, refractory metals, graphite, ceramic-metal compositions (cermets), etc. Presents comprehensive information on production methods (including powder metallurgy); test methods; and mechanical, physical, and chemical properties. 49 ref.

5203* IBM: Major User of Metal Powder Parts. *Precision Metal Molding*, v. 10, Mar. 1952, p. 34-36.

Presents various reasons for the use of powder parts. Applications in IBM business machines are given.

5204* Magnetic Observation of the Diffusion During Sintering of a Nickel-Copper Alloy. (In German.) Werner Köster and Josef Raffelsieper. *Zeitschrift für Metallkunde*, v. 42, Dec. 1951, p. 387-391.

The above was investigated by means of a magnetic method of analysis. Details of the experiments are indicated, such as establishment of sintering isotherms and observation of activation energy. Data are charted.

5205* The Sintering of Tungsten Carbide-Cobalt Cermets as a Surface Reaction. (In German.) Walther Dawihl. *Zeitschrift für Metallkunde*, v. 43, Jan. 1952, p. 20-22.

Reports on investigations concerning the difference in the effect of Co, Ni, and Fe as auxiliary metals on the sintering of tungsten carbide. Reasons for the superior effect of Co in comparison with Ni are indicated; the inferiority of Fe is also discussed. Data are tabulated.

Books

5206 Treatise on Powder Metallurgy. Vol. III. Claus G. Goetzel. 899 pages. 1952. Interscience Publishers, Inc., New York. (TN695 G55t)

Presents a classified, annotated, and indexed bibliography of 6330 items.

5207 Powder Metallurgy. 159 pages. 1951. His Majesty's Stationery Office, London. (Selected Government Research Reports, v. 9.) (TN695 G79p)

Consists of the following reports: "The Surface Energies of Metals and Alloys," C. J. Leadbeater; "The Examination of Sintered Metal Components," L. Northcott and C. J. Leadbeater; "Some Properties of Engineering Iron Powders," C. J. Leadbeater, L. Northcott, and F. Hargreaves; "Production of Iron Powder by Electrodeposition," G. E. Gardam; "German Sintered Iron Bearings," L. Northcott and C. J. Leadbeater; "Trials of Sintered Iron Driving Bands for 20mm Oerlikon Ammunition," L. Northcott and B. D. Burns; "Sintered Iron-Copper Compacts," L. Northcott and C. J. Leadbeater; "An Aluminium Alloy Made by Powder Metallurgy," R. L. Bickerdike; "Notes on German Developments in Non-Carbide Powder Metallurgy (1939-1945)," C. J. Leadbeater; and "The Tensile Strength of Titanium at Various Temperatures," R. L. Bickerdike and D. A. Sutcliffe.

See also:
5487 (Mo by powder metallurgy)
5949 (production and sintering of Be_2C)

7. METALS—WELDING OR JOINING

5208 Shielded Arc Welding Process Saves Defective Copper Molds. E. H. Frail. *American Foundryman*, v. 21, Mar. 1952, p. 44.

Describes the welding of voids found when machining water-cooled Cu molds. The particular arc-welding process employed uses a consumable electrode shielded by argon. No flux is required, resulting in the formation of welds of high purity. Process can be used on practically all commercial metals.

5209 Induction Brazes Squirrel Cage. P. H. Brace and E. B. Fitzgerald. *American Machinist*, v. 96, Mar. 17, 1952, p. 124-125.

High-power generator, a new powdered flux, and a simple set-up combine to braze copper bars to rotor rings automatically in a 4-min. operation. An "unbrazing" technique was also developed.

5210* Solid Ceramic Fluxes For Automatic Welding. (In Russian.) K. K. Khrenov and D. M. Kushnerev. *Avtogennoe Delo*, v. 22, June 1951, p. 1-4.

A series of fluxes are described which are particularly useful for welding corroded surfaces and for welding or building up low-alloy steels.

5211* Influence of Variations in the Composition of High-Manganese Flux on Its Properties. (In Russian.) K. V. Liubavskii and M. M. Timofeev. *Avtogennoe Delo*, v. 22, June 1951, p. 5-9.

An investigation was made of the above as applied to welding of carbon steels. Compositions of the fluxes and deposits are tabulated. Effects of various compositions are discussed and charted.

5212* Adherence of Slag Scale to the Surface of the Metal Seam During Welding Under Flux. (In Russian.) D. M. Rabkin, Iu. N. Gotal'skii, E. S. Kudelia, and V. V. Podgaetskii. *Avtogennoe Delo*, v. 22, June 1951, p. 10-14.

Causes of slag adherence to carbon steels were investigated. Crystal structures of the flux and of the oxidized surface of the metal are considered. Data are tabulated and illustrated. 15 ref.

5213* Electric-Arc Welding With a Bundle of Electrodes. (In Russian.) V. S. Volodin. *Avtogennoe Delo*, v. 22, June 1951, p. 18-21.

Experiments were made on the above method of welding carbon steels. The use of 2 or 3 electrodes at once resulted in increased production and better welds. Results are tabulated and illustrated.

5214* Phenomenon of Strengthening of Welds in the Production of Electrically Welded Tubes. (In Russian.) N. Z. Pertsovskii. *Avtogennoe Delo*, v. 22, June 1951, p. 21-23.

Experimental tubes were prepared from two types of low-carbon strip steel by electric-arc welding. Mechanical properties of the strip and of the finished tubes were determined. Heat treatments for producing uniform properties in the tube were established. Data are charted.

5215* New Type of Electrodes With Improved Technological Properties For Welding Stainless Steel. (In Russian.) A. A. Erokhim. *Avtogennoe Delo*, v. 22, July 1951, p. 4-9.

A new stanless-steel welding electrode was investigated under various conditions. Results are tabulated, charted, and illustrated. 14 ref.

5216* Automatic Welding of Tubes Without Rotation. (In Russian.) A. S. Fal'kevich, A. G. Mazel, and Ia. E. Rogachevskii. *Avtogennoe Delo*, v. 22, July 1951, p. 9-12.

Equipment for automatic butt welding of steel pipelines is described and discussed. Illustrations, tables, and graphs.

5217* Contact Welds With the Aid of Stored Kinetic Energy. (In Russian.) S. V. Shablygin. *Avtogennoe Delo*, v. 22, July 1951, p. 12-16.

Equipment for the above type of welding is described. Applications are discussed. Data are tabulated and illustrated. Includes circuit diagrams and oscillograms.

5218* Certain Characteristics of Sources of Heat for Welding Thin Steel Sheets. (In Russian.) A. Ia. Brodskii. *Avtogennoe Delo*, v. 22, July 1951, p. 16-18.

The heating capacity and distribution of heat for argon-arc, atomic-hydrogen, and oxyacetylene welding of 18-8 sheet steel were determined. Data are discussed and charted.

5219 Effect of Elongation on Weld Quality. R. G. Alison. *Canadian Metals*, v. 15, Apr. 1, 1952, p. 44-45.

Demonstrates that ability of the weld to elongate depends more on the surface condition of the weld than it does on the type of electrode used.

5220 Welding of Machinery, Pressure Vessels and Piping. R. E. Lorentz, Jr. *Combustion*, v. 23, Mar. 1952, p. 42-45.

Reviews formulation of welding codes, briefly describes various welding procedures, and discusses inspection methods. Metallurgical considerations are also touched upon.

5221* Local Preheating by Induction in the Arc Welding of Steel Plate. L. N. Belov. *Engineers' Digest*, v. 13, Mar. 1952, p. 79-81. (Translated and condensed from *Avtogennoe Delo*, Dec. 1951, p. 9-11.)

Considers the above, describing conditions for proper operation including arc condition, flux density, inductor arrangement, and heating time. Simultaneous preheating and welding can be done. Diagrams and table.

5222* Welding Stainless Steels Without Carbide Precipitation. J. A. Goodford and D. W. Kaufmann. *Industry & Welding*, v. 25, Mar. 1952, p. 31-32, 73.

Recommends and describes ways of rapid cooling of heat-affected zone promptly after welding to reduce chances of subsequent intergranular corrosion.

5223* Effects of Moisture in Electrode Coatings. *Industry & Welding*, v. 25, Mar. 1952, p. 48-49, 51, 84-97; Apr. 1952, p. 35-36, 38, 69-70, 72.

An open-forum discussion by 6 outstanding welding authorities on some important questions concerning the above.

5224* Fundamental Facts About Brazing Fluxes. *Industry & Welding*, v. 25, Mar. 1952, p. 54-56, 59-61, 95.

Discusses types, functions, purpose, properties, performance, and precautions.

5225* Latest Developments in Weld Repairing of Steel Castings. R. A. Willey. *Industry & Welding*, v. 25, Apr. 1952, p. 60-62, 65-68.

5226* Higher Tensile Short-Link Steel Chain and Chain Slings. W. Gibson Biggart. *Transactions of Institution of Engineers & Shipbuilders in Scotland*, v. 95, pt. 3, 1951-52, p. 149-176; disc., p. 176-180.

Deals with problems arising from the manufacture of high-tensile-strength chain by resistance welding and flash-butt welding. Mechanical properties are described and some suggestions presented for increasing safe working loads. Finally, the assembly of all-steel slings, using atomic-hydrogen welding for joining links, is discussed.

5227 Reports of International Commissions. *Transactions of the Institute of Welding*, v. 14, Dec. 1951, p. 211-215.

Reports of Commissions on electric-arc welding, resistance welding, fatigue of welded structures, weldability, and brittle fractures. Presented at Oxford, England, July, 1951.

5228 Titanium Aids Silver Brazing. Arnold S. Rose. *Iron Age*, v. 169, Mar. 20, 1952, p. 96-97.

Non-brazing qualities of Ti have proved helpful in silver soldering a Type 321 stainless-steel assembly in fused KCl-NaCl bath. Ti strips around the assembly act as dams and hold the silver solder in place. The salt bath operates at 1350°F. Rings must be replaced after 25 hr. exposure.

5229 Ultrasonics Make Soldering Easier. *Iron Age*, v. 169, Mar. 27, 1952, p. 105.

The method is said to be effective with metals such as Al which have chemically inactive oxides and are difficult to solder using ordinary flux methods.

5230* Production Problems. XIII. Welding of Tractor Steering Wheels. *Iron & Steel*, v. 25, Mar. 1952, p. 89-92. (Concluded.)

Presents detailed results of the examination of defective joints in the above. Photomicrographs.

5231* The Welding of Pressure Vessels. H. Harris. *West of Scotland Iron and Steel Institute Journal*, v. 58, 1950-51, p. 11-38; disc., p. 39-48.

The present stage of development in the manufacture of welded pressure vessels is described. The problems caused by the necessity of using heavy boiler plates are discussed and a brief description of the inspection procedure is given.

5232* Measurement of Heat Generated Between the Base Metal and the Electrode in Arc Welding. (In Japanese.) Yutaka Imai and Toshiaki Hagiwara. *Journal of Mechanical Laboratory*, v. 5, Nov. 1951, p. 290-293.

Presents results of experimental and theoretical investigation of the above, for various types of electrodes. Compares American and Japanese types. Apparatus is diagrammed; results are tabulated.

5233 The Application of Ultrasonic Soldering Techniques. Alan E. Crawford. *Light Metals*, v. 15, Mar. 1952, p. 102-104.

Describes and diagrams apparatus and procedure developed by Mullard, Ltd., in Britain, for ultrasonic soldering of Al and its alloys. Mg and Be cannot be soldered satisfactorily as yet.

5234 Welded Gear Blanks. Kenneth N. Mills. *Machine Design*, v. 24, Mar. 1952, p. 141-142, 194.

Discusses factors to be considered in the above. Typical blanks consist of a medium-carbon (SAE-1045) steel rim, structural-steel plate webs, and a low-carbon steel hub, joined by submerged-arc welding.

5235 How to Select Brazing and Soldering Materials. H. R. Clauser. *Materials & Methods*, v. 35, Mar. 1952, p. 105-120.

Aids in solving the selection problem by presenting a broad summary of types, characteristics, and uses of available brazing and soldering materials. It covers: the selection problem; brazing alloys and fluxes; soft solders and fluxes; and brazing alloys and solders for various metals.

5236* How to Join Copper and Aluminum. Walter P. Hill. *Refrigerating Engineering*, v. 60, Apr. 1952, p. 347-349, 412.

Describes a series of tests and experiments conducted for a period of 6 yrs. to develop a practical and foolproof production method for joining Cu and Al.

5237* Adhesives For Metals. K. S. Meakin. *Research*, v. 5, Mar. 1952, p. 126-132.

Discusses the development of adhesives, and their application for joining metal under the critical conditions required by modern aeronautical practice.

5238* Development of Electrodes for Welding of Austenitic Steels for High-Pressure Boilers. (In German.) E. Kauhausen and H. A. Vogels. *Schweissen und Schneiden*, v. 4, Feb. 1952, p. 35-40.

Reports on the development of an austenitic electrode, free of ferrite, which can be used for welding even very thick sheets. With respect to heat resistance, intercrystalline corrosion, and embrittlement resistance, these welds are of the same quality as the base material. Tables, charts, and photographs.

5239* Progress in the Field of Welding and Cutting: Present Status of Welding Technique in the Soviet Union. (In German.) O. Vollenbruck. *Schweissen und Schneiden*, v. 4, Feb. 1952, p. 58-61.

Reviews the above on the basis of the literature. Types of welding, of testing, and methods for prevention of cracking are described. 20 ref.

5240* The Production of Chains With Aid of Electric Resistance Welding. (In German.) W. Püngel. *Schweisstechnik*, v. 5, Nov. 1951, p. 121-124.

Describes advantages of method; emphasizes particularly the application of above method to chains made of special steels. Micrographs, photographs, and schematic drawings.

5241 A Survey of Modern Theory on Welding and Weldability. D. Seferian. *Sheet Metal Industries*, v. 29, Mar. 1952, p. 239-248, 254.

Discusses arc-welding electrodes. Includes functions of the electrode coating, electrical and physical action of the coating, slag analysis, types of slags, and refining of the metal. Micrographs. 18 ref. (To be continued.)

5242 Discussion on Resistance Welding. H. E. Dixon and H. G. Taylor. *Sheet Metal Industries*, v. 29, Mar. 1952, p. 249-254.

Discussion of above paper presented at the annual conference of SASMUTA and published in the Dec. issue of *Sheet Metal Industries*.

7. *Metals—Welding or Joining*

5243 Bigger Welders Do Bigger Job. *Steel,* v. 130, Mar. 17, 1952, p. 91-92.

Discusses the technical advances in special extra-large-size spot-welding equipment developed by Ryan Aeronautical Co. Advantages are cited and examples given.

5244* Welding Procedures for the Copper-Base Alloys. II. (Concluded.) Lester F. Spencer. *Welding Engineer,* v. 37, Apr. 1952, p. 42-46, 48.

Concludes description of fusion welding of the various bronzes and of alloys containing Ni. Discusses resistance-welding methods for Cu and all Cu-base alloys. Tables, photographs, and 16 ref.

5245* "Contour" Arc Welding. F. J. Pilia. *Welding Engineer,* v. 37, Apr. 1952, p. 54.

Describes and illustrates new semiautomatic equipment which permits welding contoured sheet-metal assemblies by a manual method affording advantages of mechanized welding.

5246* Projection Welding of Steel in Heavy Gages and in Dissimilar Thickness. Ernest F. Nippes and John M. Gerken. *Welding Journal,* v. 31, Mar. 1952, p. 113s-124s; disc., p. 124s-125s.

Discusses the effects of weld current, weld time, electrode force, and projection dimensions on weld formation and weld quality in projection welding. Includes graphs and tabular data.

5247* Welded Joints Between Dissimilar Metals in High Temperature Service. R. W. Emerson and W. R. Hutchinson. *Welding Journal,* v. 31, Mar. 1952, p. 126s-141s.

Discusses effects of time and temperature on the structural stability of welded joints between austenitic and ferritic steels using austenitic electrodes. Test plates were tested for mechanical properties after specific heat-treatments and metallographic observations. Numerous graphs and photomicrographs.

5248* Investigation of Factors Which Determine Performance of Weldments. R. H. Aborn. *Welding Journal,* v. 31, Mar. 1952, p. 141s, 160s.

Discussion of paper by C. E. Hartbower and W. S. Pellini, published in Oct. 1951 issue.

5249* Seam Welding Containers Automatically. R. H. Blair. *Welding Journal,* v. 31, Mar. 1952, p. 207.

A discussion of paper by C. S. Seltzer, Sept. 1951 issue.

5250* Schlieren Analysis of Inert-Gas Arc Shields. W. B. Moen and G. J. Gibson. *Welding Journal,* v. 31, Mar. 1952, p. 208-213.

The schlieren method of making gas-flow patterns visible was applied to a comparison study of He and A as arc shield with nonconsumable electrode equipment. Results indicate that either gas will provide adequate coverage and the choice of gas depends only upon the desired electrical characteristics and economics. A brief explanation of the schlieren appartus and a number of photographs substantiating the results are included.

5251* Resistance and Fusion Welding of Titanium and Its Alloys. E. F. Holt and W. H. Moore. *Welding Journal,* v. 31, Mar. 1952, p. 213-216.

Presents some preliminary data on properties of Ti and its alloys; and techniques for spot, flash, and inert-arc welding. Includes tabular data and photomicrographs. 14 ref.

5252* Flash Butt Welding of High-Temperature Alloys. I. A. Oehler. *Welding Journal,* v. 31, Mar. 1952, p. 230-232.

Flash-butt welding, a commonly applied high-production method of joining carbon steels, is readily applicable to joining of the various heat-resistant alloys and nonferrous materials used in jet-engine production. Electrical and mechanical requirements for various joint sections are presented. A brief description of typical flash welding specifications covering certification of equipment and production control is given.

5253 Industrial Brazing. Part 3. Heating Methods and Equipment. E. V. Beatson and H. R. Brooker. *Welding and Metal Fabrication,* v. 20, Mar. 1952, p. 103-109.

Discusses carbon resistance heating, electrode carbons, direct interface resistance heating, electrode materials for interface resistance brazing, gas-fired salt baths, and electrically heated salt baths. Diagrams, graphs, and tables.

5254* Sky-Beams; Spot Welds Reduce Weight. *Western Machinery and Steel World,* v. 43, Mar. 1952, p. 91-93.

Structural floor beams of remarkably high strength-weight characteristics are being fabricated with spot welding for use in the cargo-carrying floors of the Boeing C-97 Stratofreighter. Material is clad Al alloy.

Books

5255 Riveting Alcoa Aluminum. 81 pages. 1951. Aluminum Company of America, Pittsburgh. (TS555 Al82r)

An illustrated manual.

5256 Weld Design. Harry D. Churchill and John B. Austin. 216 pages. 1949. Prentice-Hall, N. Y. (TJ230 C47u)

Includes the stress-analysis problem; selection of materials, methods of construction; and welding specifications, processes, and procedures.

5257 Handbook of Welded Steel Tubing. 214 pages. 1948. Formed Steel Tube Institute, 1621 Euclid Ave., Cleveland, Ohio. (TS280 F76h)

Presents factual data on welded steel tubing. Discusses general processes of fabrication, mechanical properties, and a variety of material such as mill practice and trade customs. Tabular data give standards of the industry and a compilation of engineering aids.

See also:

5135 (welding Ni-base casting alloys)
5166 (welding of artillery shells)
5323 (welding in surface conditioning of steel)
5505 (weldability of B steel)
5541 (welding effects on intergranular corrosion of stainless)
5686 (measuring melting temperatures of welding-rod castings)
5803a (casting vs. welding)
5807 (methods for joining Al in ships)
6331 (plastic-metal bonding)
6590 (metal-to-insulator seals)

8. METALS—THERMAL TREATMENT

5258* The Effect of Alloy Elements on the Heat Treatments of Grey Cast Iron. M. M. Hallett. *Alloy Metals Review,* v. 8, Mar. 1952, p. 2-8.

Reviews the above and their effects on hardness and tensile strength. 30 ref.

5259 Measurements of Case Depth. James Sorenson and Alfred Hendrickson. *American Machinist,* v. 96, Mar. 31, 1952, p. 129.

Presents a table which can be used for establishing values for routine checking of carburized case depths on individual gears and similar parts after carburizing and hardening.

5260* Accuracy of Statistical Methods for the Computation of Carbon Peneration Depths in Carburized Bars. (In German.) Hans Schrader. *Archiv für das Eisenhüttenwesen,* v, 22, Nov.-Dec. 1951, p. 411-415.

Critical discussion of a statistical computation method advanced by A. Slattenschek. The various discrepances in the method are indicated, tabulated, and charted.

5261 Metal Processing at Subzero Temperatures. G. B. Olson and H. T. Gregg, Jr. *Heating and Ventilating,* v. 49, Apr. 1952, p. 83-87.

Commercial equipment which is now available for producing temperatures as low as −200°F., has made possible an increased use of subzero temperatures for processing metals. Data are presented on the various applications of low temperature in this field.

5262 Production Heat Treatment of Ross Automatic Steering Assemblies. George Goepfert. *Industrial Heating*, v. 19, Mar. 1952, p. 408-410, 412, 414, 416, 418, 420, 422, 424, 571.

Describes and illustrates equipment and procedures of Ross Gear & Tool Co., Lafayette, Ind. Plain-carbon and low-alloy steels are used.

5263 Special Gas-Fired Relieving Furnaces Used in Manufacture of Large Processing Equipment. *Industrial Heating*, v. 19, Mar. 1952, p. 462, 464, 466, 468, 470, 572-573.

Describes and illustrates the above, used by Wyatt Metal & Boiler Works in Houston and Dallas, Texas. Their products include pressure vessels and other equipment for the petroleum industry, stainless steel and nickel items for the chemical industry, various types of tanks, towers, blast-furnace equipment, etc.

5264 Flame Hardener Treats Cams at High Speeds. W. G. Patton. *Iron Age*, v. 169, Mar. 20, 1952, p. 98-99.

Tells how automatic-transmission cams are being flame-hardened at close to 550 pieces per hr. on an automatic machine at Buick Motor Div. After loading, the operator starts the automatic hardening cycle. Oxygen-propane flame brings cams to heat. Parts are dropped into the oil quench, then conveyed out of machine and deposited in tote pans. Parts are fabricated from SAE 1062 and 4063 steel.

5265 Close-Tolerance Steel Parts Austempered Without Distoration. John Kolb. *Iron Age*, v. 169, Apr. 3, 1952, p. 142-144.

Describes modified austempering process, using automatic, continuous saltbaths and conveyor system worked out so that 4140 steel for rocket motors can be machined in the annealed condition before hardening. Each rocket-motor body is subjected to 25,000-psi. hydrostatic tests, followed by final inspection for mechanical tolerances. Illustrated.

5266 Files and Tools; Advantages of Heat Treatment in Salt Baths. D. Thomas. *Iron & Steel*, v. 25, Mar. 1952, p. 85-88.

Deals with the general advantages of salt-bath heat treatment; recent developments in salts produced for specific purposes; the technique; appropriate equipment; and particular advantages of each process.

5267 Influence of Temperature, Gas Composition and Flow on Carbo-Nitrided Cases. W. H. Holcroft and D. J. Schwalm. *Metal Progress*, v. 61, Apr. 1952, p. 89-93.

Substantiates some of the theories of carbonitriding by reporting certain laboratory and production experiences. Deals with effect of NH_3 on case properties; of rate of flow on CO-CO_2 equilibrium; and with effect of temperatures above 1450°F.

5268 New Flame-Hardening Technique; Oxy-Town-Gas Heating With Automatic Control. *Metal Treatment and Drop Forging*, v. 19, Mar. 1952, p. 113-114.

Describes flame-hardening machine which can be developed in various designs for handling specific parts, also milliscope temperature-control mechanism.

5269 Induction Hardening of Crankshaft Journals; New Equipment Speeds Production at the Sheffield Works of Ambrose Shardlow & Co. Ltd. Tom Bishop. *Metal Treatment and Drop Forging*, v. 19, Mar. 1952, p. 131-134.

5270* The Formation of Cracks During Heat Treatment of Tools. (In Russian.) A. P. Guliaev and S. P. Yakushev. *Stanki i Instrument*, v. 22, Aug. 1951, p. 26-27.

Data on the above are charted and discussed.

5271 Closer Hardenability Control For Silicon-Chromium Steel. B. C. Schott and S. Isenberg. *Steel*, v. 130, Apr. 7, 1952, p. 114-115.

Various tests were run on experimental heats of Si-Cr valve steel. Results reveal that hardenability decreases as Si content increases. Photomicrographs, graphs, and tables.

5272 Dutch Reader Comments on "Influence of Microstructure on Heat Treating and Machining". W. J. van den Bergh. *Steel Processing*, v. 38, Mar. 1952, p. 139-140, 146-147.

Critical comments on article by Pliny J. Wilson (Nov. issue.) Discussion of the letter by Howard E. Boyer is also included.

5273 Rohr Gets Accurate Temperature Control of Aluminum Alloys by Solution Heat Treating. W. H. Wynne. *Western Metals*, v. 10, Mar. 1952, p. 32-33.

Describes and illustrates above at Rohr Aircraft Corp. Tables give recommended temperature range for solution heat treating of Al alloys, and suggested soaking time for solution treatment of wrought alloys (excluding forgings).

See also:

5144 (annealing of small-converter steel.)
5163 (treatment of drill steel)
5170 (heat treatment of bolts and nuts)
5171 (heat treatment in the rolling mill)
5214 (heat treatment of arc-welded steel tubes)
5343 (dependence of crystal perfection on annealing temperature)
5370 (annealing of carbon steel)
5378 (tempering high-carbon martensitic steels)
5379 (hardenability of alloy steels)
5388 (tempering of Al-Cu-Mg-Si alloys)
5503 (heat treatment vs creep resistance of steel)
5541 (heat treatment of stainless steels)
5723 (heat treatment of manganin wire)
5815 (heat treatment of die steels)

9. CLEANING, FINISHING, AND COATINGS—METALLIC

5274* Influence of Tribenzylamine on the Process of Electrocrystallization of Tin. (In Russian.) A. A. Kriukova and M. A. Loshkarev. *Doklady Akademii Nauk SSSR*, new ser., v. 81, Dec. 21, 1951, p. 1097-1100.

Results of experimental investigation of the above are charted, tabulated, and discussed. Effects of different additives to the deposition solutions were determined.

5275* Electropolishing and Chemical Polishing of Aluminum. (In German.) H. Hug. *Aluminium Suisse*, v. 2, Jan. 1952, p. 4-13.

Briefly reviews the above processes, and discusses their application in Switzerland and various patents pertaining to them. Includes colored photographs, showing decorative applications. Various bath compositions are given.

5276 The Extension of the Life of a Nickel Bath by the Use of Barium Peroxide. Jason M. Zander and Otto C. Linhart. *Better Enameling*, v. 23, Mar. 1952, p. 6-7, 29-30.

Discusses results of an investigation of the above, used to deposit a thin film of Ni on steel prior to vitreous enameling.

5277 Finishing Aluminum Castings. Evans Newcomb. *Canadian Metals*, v. 15, Apr. 1, 1952, p. 30-31.

Describes briefly the above, using coated abrasive belts. Covers such topics as sand- and die-cast Al, inside polishing of aluminumware, and mechanics of polishing Al.

5278 Metal-Finishing by Vacuum Evaporation; A Commercial Method for Finishing Jewelery. *Chemical Age*, v. 66, Mar. 1, 1952, p. 349-351.

Describes method developed by a British organization, and its applicability to various base metals and deposited metals.

5279 Galvanic Behavior of Tin Dipped Coatings on Copper Alloys. F. L. LaQue. *Corrosion* (News Section), v. 8, Apr. 1952, p. 1.

The author and his associates have become convinced that above coatings, as well as those of the Pb-Sn alloys, such as wiping solder (60% Pb, 40% Sn) may form corrosion-product films that may make them more noble without any effect due to the alloy layer near the interface between the coating and the base metal. Brief discussion and experimental graph.

5280* Degreasing in the Plating Shop; Plant and Technique Which Make For Better Cleaning at Lower Cost With Reduced Trichlorethylene Consumption. W. F. Jesson. *Electroplating and Metal Finishing*, v. 5, Mar. 1952, p. 77-84.

9. *Cleaning, Finishing, and Coatings—Metallic*

5281* Electrodeposition of Metal Powders; the Significance of Diffusion Processes at the Cathode. (In German.) *Helvetica Chimica Acta*, v. 35, Feb. 1, 1952, p. 363-374.

Reviews the above problem on the basis of the literature. Interprets the role of current density, transition time, and conditions existing when vertical electrodes are used. 90 ref.

5282 To Conserve Copper—New Method Tested for Cladding Bullet Jackets. Sam Tour. *Iron Age*, v. 169, Mar. 27, 1952, p. 108-110.

Describes new method for cladding Cu to steel. It has been tested, but is not yet in commercial production. Molten Cu or gilding metal is poured onto a steel slab with the aid of a methyl borate flux. Welded-on side walls hold the metal on the steel slab until it solidifies. Then the composite is rolled out. Tests indicate an excellent bond between the two metals.

5283 Caustic Etch Treats Aluminum Without Sludge or Scale. R. J. Stell. *Iron Age*, v. 169, Apr. 3, 1952, p. 138-139.

Formation of sludge and scale in caustic treatment of Al has been virtually eliminated with a new caustic etching product. Dissolved Al remains in solution as sodium aluminate, rather than being deposited as alumina on tank walls and heating coils. Tanks are easily cleaned by hosing. More consistent finishes are reported.

5284 An Introduction to Clad Metals. Walter L. Keene. *Iron and Steel Engineer*, v. 29, Mar. 1952, p. 109-118; disc., p. 118-119.

General discussion. Surveys characteristics; and principles and methods of bonding. Gives extensive list of U. S. patents on composite and clad metals. Diagrams.

5285 Chemical and Anodic Treatments; A Patent Review. *Light Metals*, v. 15, Mar. 1952, p. 93.

Considers anodizing patents published by the British Patent Office since 1946, and appraises their potential or known usefulness. (To be continued.)

5286* Metal Fabrication by Electroforming. Alan Whittaker. *Machinery* (London), v. 80, Feb. 28, 1952, p. 362-366.

Discusses advantages and limitations of the graphite-coating, metal-powder, silver-reduction, and vacuum-sputtering methods of producing conductive layers on various types of surfaces.

5287 Low Cost Black Oxide Finish Produced on Steel by Chemical Dip Method. A. J. Mitchell. *Materials & Methods*, v. 35, Mar. 1952, p. 92-95.

Describes attractive, durable, and corrosion-resistant finish suitable for a variety of applications, including machine parts, bearings, gages, aircraft-engine components, and similar products.

5288* The Role of Chelating Agents in the Plating Industry. Harold Narcus. *Metal Finishing*, v. 50, Mar. 1952, p. 54-62.

Discusses first the more familiar sequestering agents; secondly, the commercial chelating agents, making a comparison between the two; and finally the present applications of chelating agents in the metal-finishing field. 13 ref.

5289* Chemical Analysis and Control of Alkaline Metal Cleaners. K. E. Langford. *Metal Finishing*, v. 50, Mar. 1952, p. 66-71, 74.

Discusses the above. Presents some control methods which can be used for various compositions and for proprietary cleaners of unknown composition.

5290* Measuring Average Thickness of Plated Coatings. *Metal Finishing*, v. 50, Mar. 1952, p. 81.

Presents calculation method for the above. Table gives factors applicable to 13 different metals most commonly electrodeposited.

5291 Sprayed Aluminium-Base Coatings for Aluminium Alloys. F. A. Champion. *Metal Industry*, v. 79, Oct 26, 1951, p. 355-358; Nov. 2, 1951, p. 384-385.

Laboratory salt-spray tests have shown that sprayed Al coatings provide a practical means of raising the corrosion resistance of Al-alloy extrusions and castings which contain Cu as a major alloying constituent to the high level of clad strong alloy plate and sheet. For Al-Cu alloys, coatings of 99.5% purity provide adequate protection. Further work is required to develop a technique for spraying satisfactory coatings of higher purity. Application of the principle to other alloys is discussed and the composition of appropriate coatings is suggested.

5292 Diffusion as a Cause of Porosity. *Metal Industry*, v. 80, Mar. 14, 1952, p. 213.

Describes and discusses results of experiments using Cu, Al, Ni, Zn, and Sn in electroplating in an attempt to explain displacement of the interface and porosity in the diffusion zone.

5293* Testing Methods for Nickel Electroplating Baths and Nickel Coatings. (In German.) J. Elze. *Metall*, v. 6, Jan. 1952, p. 5-11.

Describes various testing methods, on the basis of the literature, for adhesive strength, porosity, hardness, etc. The importance of internal stresses in the material to be plated, also other factors, are discussed. Diagrams, micrographs, and 12 ref.

5294.* Lacquer Coating on Aluminum. Max Schenk. (In German.) *Metall*, v. 6, Mar. 1952, p. 136-138.

Discusses various methods by which lacquers of different composition can be made to adhere to an Al surface, particularly by an anodic pretreatment developed by the author. Tests of this method are described. Photographs illustrate the article.

5295* Grinding and Polishing Agents. (In German.) W. Burkart. *Metalloberfläche*, ser. A, v. 6, Jan. 1952, p. A1-A4.

Discusses the properties, hardness, chemical composition, and specific uses of above. Photomicrographs show structures of some of the more commonly used agents.

5296* Measurement of Luster as a Method of Evaluating Metallic Surfaces. (In German.) Joh. Elze and H. Grüss. *Metalloberfläche*, ser. A, v. 6, Feb. 1952, p. A17-A23.

Instrument described measures strictly directed reflection, reflection within a selected range of dispersion angle and astigmatism of dispersion. Diagrams, photographs, graphs, photomicrographs, and tables.

5297* Improvement of Surface Quality of Ground Workpieces by Electrolytic Polishing and Its Relationships to Mechanical Properties. (In German.) J. Heyes. *Metalloberfläche*, ser. B, v. 3, Dec. 1951, p. B177-B179.

Reports on experiments on electropolishing of carbon and alloy-steel crankshafts. Investigation shows that the process can also be applied successfully to larger workpieces. Results are tabulated, charted, and illustrated by micrographs.

5298* Comparative Investigation of Polishing With a Phosphoric Acid—Sulfuric Acid and an Acetic Acid—Perchloric Acid Electrolyte. (In German.) J. Heyes. *Metalloberfläche*, ser. B, v. 3, Dec. 1951, p. B179-B181.

Results of experiments on application of above solutions to electropolishing of an 0.35%-C steel are tabulated, charted, and discussed.

5299* Electrolytic Brass Coatings. (In German.) O. Krämer. *Metalloberfläche*, ser. B, v. 3, Dec. 1951, p. B181-B183.

Discusses practical requirements for successful electrolytic brass plating, such as composition of the bath, temperature, current, voltage; as well as causes of various defects.

5300* Electrolytic Deposition of Tin Alloys. (In German.) Edmund R. Thews. *Metalloberfläche*, ser. B, v. 4, Jan. 1952, p. B5-B6.

Briefly discusses both composition and conditions of electroplating Sn-Pb alloys.

5301* Palladium Deposits. (In German.) R. Erdmann. *Metalloberfläche*, ser. B, v. 4, Jan. 1952, p. B6-B7.

Review of literature and patents on above includes discussion of both compositions and plating conditions.

5302* Patina Production on Objects of Art. (In German.) K. Stark. *Metalloberfläche*, ser. B, v. 4, Jan. 1952, p. B7-B8.

Describes procedure for producing an antique patina on vases, dishes, busts, etc., made of silver, gold, copper, or brass.

5303* Difficulties Encountered During Barrel Galvanizing. (In German.) Otto Niedermeyer. *Metalloberfläche*, ser. B, v. 4, Jan. 1952, p. B10-B11; Feb. 1952, p. B24-B25.

Briefly discusses improved methods of degreasing, pickling, and galvanizing for greater resistance to corrosion.

5304 The Action of Pickling Inhibitors. (In Italian.) Antonio Indelli and Giampaolo Bolognesi. *Metallurgia Italiana*, v. 44, Feb. 1952, p. 73-77.

Presents and discusses gas-analysis data on the action of allyl isothiocyanate at 25 and 60°C. The action of this reagent as a function of acid concentration was determined. An evaluation was made of efficiency of the pickling inhibitor both with respect to economy in iron and acid and of corrosion resistance of the surfaces obtained. Includes tables and charts. 33 ref.

5305* Some Remarks on the Subject of Zinc Replacement in Hot Galvanizing. (In French.) A. Gordet. *Métallurgie et la Construction mécanique*, v. 83, Jan. 1952, p. 53, 55-56.

Discusses the above with respect to industrial tests, various working methods, bath compositions, etc.

5306* Advantages of Chromium Plating in Combustion Engines. (In French.) G. Mohr. *Métallurgie et la Construction mécanique*, v. 84, Feb. 1952, p. 117, 119-120.

Discusses the above, applied to various parts. Experiments on above problem are described and illustrated.

5307 White Brass Plating—One Solution to the Nickel Freeze. Webster B. Knight. *Metal Progress*, v. 61, Mar. 1952, p. 61-64.

Discusses results of investigations made to determine practicable alternatives for Ni in automotive plating. Describes 5 methods giving advantages and drawbacks, emphasizing the white-brass, Cr-flash method. Cu-Zn constitution diagram.

5308 Perchloric Acid Hazard. E. Knuth-Winterfeldt. *Metal Progress*, v. 61, Mar. 1952, p. 80.

Discusses precautionary measures for safety when using perchloric acid in electropolishing.

5309 Polishing Tantalum. G. W. Wensch, K. B. Bruckart, and M. Conolly. *Metal Progress*, v. 61, Mar. 1952, p. 81.

Gives details of electropolishing technique and solution for the above.

5310 Factors Influencing Structure of Electrodeposits. *Metal Progress*, v. 61, Mar. 1952, p. 106. (Condensed from "The Structure of Electrodeposits," by J. J. Dale.)

Discusses and classifies structure of electrodeposits and the factors affecting their growth.

5311* The Hydride Aluminum Plating Bath. *Modern Metals*, v. 8, Mar. 1952, p. 24.

Describes new Al-plating technique, employing a hydride plating bath. The new bath consists of an ethereal solution of Al chloride and a metal hydride.

5312 Comparative Wear Characteristics of Some Electrodeposited Metals. R. F. Ledford and E. A. Dominik. *Plating*, v. 39, Apr. 1952, p. 360-365.

Describes work done primarily to determine the wear resistance of electrodeposits commonly applied to printing plates. The standard test specimen was a section of a printing plate prepared in a standard, uniform manner. Data are presented on the comparative wear characteristics of electrodeposits produced from like solutions of different composition and operating conditions. The data include the effect of some commonly considered contaminants or addition agents. Three Cu-plating solutions, one Fe solution, one Cr solution, and 8 Ni solutions were used.

5313 Tentative Recommended Practice for Preparation of and Plating on Aluminum Alloys. (Concluded.) *Plating*, v. 39, Apr. 1952, p. 366-368, 375-376.

This section covers Cu plating, Cr plating, Au plating, Ni plating, Ag plating, Sn plating, and Zn plating on Al; racking; and rinsing. Includes appendix on cleaning and conditioning treatments.

5314 Conservation of Nickel in the Plating of Chemical Process Equipment. A. Kenneth Graham. *Plating*, v. 39, Apr. 1952, p. 369-370, 376.

Presents a brief discussion of factors that influence the minimum coating thickness required in plating of steel for the above. Data are tabulated.

5315* Black Anodizing of Aluminum Die Castings Is a Production Operation. K. W. McCrea. *Precision Metal Molding*, v. 10, Mar. 1952, p. 51-53.

Describes some of the processes used in the above.

5316* What Electroforming Offers the Designer of Precision Parts. A. G. Buschow. *Precision Metal Molding*, v. 10, Mar. 1952, p. 39-40, 65-66.

Discusses the above. Includes metals used and gives typical applications.

5317* Plating to Meet Today's Conditions. Myron B. Diggin. *Products Finishing*, v. 16, Mar. 1952, p. 38-40, 42, 44, 46, 48.

Discusses and describes various finishing methods and the alterations made due to current shortages of needed metals such as Ni, Cu, Sn, and Cd.

5318* A Method for Determining Strains Produced by Electrodeposits With the Aid of Wire Strain Gages. (In French.) E. G. Ramachandran and K. V. Chinnappa. *Revue de Métallurgie*, v. 49, Jan. 1952, p. 60-64.

Describes, diagrams, and illustrates apparatus and procedure. Includes details of calculations and results of application of the technique to Ni deposits on steel. 11 ref.

5319* Weld Deposited Coatings on Street Car Rails. (In German.) G. Krüger. *Schweissen und Schneiden*, v. 4, Feb. 1952, p. 50-55.

Describes technological and metallurgical means for increasing the crack and wear resistance of rails. Suggests use of killed "M steel" and austenitic 18/8/6 electrodes for certain types of rails. Discusses the problems of electrode development, of thermal expansion, of internal and superficial stresses, and of types of current applied. Micrographs and schematic diagrams.

5320 Methods of De-Enamelling Vitreous-Enamelled Components. W. H. Billingham. *Sheet Metal Industries*, v. 29, Mar. 1952, p. 269-272.

Discussion on the above includes de-enamelling with caustic-soda solution, the molten caustic method, de-enamelling by shotblasting, and de-enamelling by acid.

5321* New Technology of Electric-Arc Hard-Surfacing Cutting Tools. (In Russian.) G. P. Ivanov. *Stanki i Instrument*, v. 22, May 1951, p. 20-22.

A machine for applying a hard coating to cutting tools was developed. Tests were made under various conditions. The equipment is described. Test results are discussed and charted.

5322 Electroforming Produces Intricate Shapes to Close Tolerances. Charles L. Faust and William H. Safranek. *Tool Engineer*, v. 28, Apr. 1952, p. 37-40.

Describes the process, costs, properties, and applications of electroformed metals. Illustrated.

5323* Surface Conditioning of Structural Steel. R. E. Somers and H. C. von Blohn. *Welding Journal*, v. 31, Mar. 1952, p. 193-198.

Considers conditioning methods applied by Bethlehem to structural shapes after rolling. These include grinding, chipping, and welding. Discusses relative applications of each. Stresses conditioning by welding.

5324* Modern Developments in Metallizing. Sam Tour. *Welding Journal*, v. 31, Mar. 1952, p. 199-206.

Describes modern developments in metal spraying and in sealing or impregnating the porous metal coatings to make them more resistant and impervious in corroding environments. Includes mechanical properties and corrosion protection.

5325* Coating of Freshly Passivated Iron and Its Relationship to Refractory Properties. (In German.) Klaus J. Vetter and Hans-Jurgen Booss. *Zeitschrift für Elektrochemie*

9. *Cleaning, Finishing, and Coatings—Metallic*

Berichte der Bunsengesellschaft für Physikalische Chemie, v. 56, Jan. 1952, p. 16-19.

The black coating formed during the passivation of iron with HNO_3 increases in thickness and blackness with carbon content. Experiments showed the coating to be Fe_3C and that refractoriness decreases because of the reducing action of this carbide. Experiments are described and illustrated; data are tabulated and graphed.

5326* Does the Gamma-Phase of Iron Exist in Vapor-Deposited Coatings? (In German.) Hans König. *Zeitschrift für Metallkunde*, v. 43, Jan. 1952, p. 26-28.

Reports on experiments concerning the above. At room temperature, there is no evidence of a γ-phase of Fe in such layers. 10 ref.

5327* Electrolytic Brass Plating From Non-Cyanide Solutions. (In Russian.) A. I. Stabrovskii. *Zhurnal Obshchei Khimii*, v. 21(83), July 1951, p. 1223-1229.

Experiments were made on the deposition of Cu-Zn alloys from a series of solutions (chlorides, thiosulfates, alkaline solutions with glycerine, etc.) which did not contain cyanides. Results are discussed, tabulated, and charted.

5328* The Problem of the Change of Acidity in the Cathode Region (Catholyte) During Electrodeposition of Metals. (In Russian.) S. I. Berezina and G. S. Vozdvizhenskii. *Zhurnal Prikladnoi Khimii*, v. 24, Aug. 1951, p. 832-839.

pH values of the above were measured by means of Pt-H_2 electrodes. Data on variations of pH with H^+ ion concentration, current density, and different concentrations of various acids and salts are charted and discussed.

5329* Electrode Potentials During Electrolysis of Salts of Various Metals With Mercury Electrodes. (In Russian.) P. P. Tsyb and M. T. Kozlovskii. *Zhurnal Prikladnoi Khimii*, v. 24, Aug. 1951, p. 840-850.

The above were determined experimentally for salts of Sn and Cd. Dependence of electrode potentials on metal concentration and acidity of the electrolyte was established for various conditions. Data are discussed, tabulated, and charted.

5330* Electrolysis of Zinc Salts. (In Russian.) M. T. Kozlovskii, P. P. Tsyb, and E. I. Ruzina. *Zhurnal Prikladnoi Khimii*, v. 24, Aug. 1951, p. 882-886.

The dependence of electrode potentials on the concentration of Zn in the amalgam and in the electrolyte for various conditions was determined. Data are tabulated and charted.

Books

5331 Analysis of Electroplating and Related Solutions. Kenneth E. Langford. 387 pages. 1951. Electroplating and Metal Finishing, Teddington, Middlesex, England. (TS670 L26a)

Presents over 300 methods for the determination of principal constituents and impurities, together with chapters on sampling; control of cleaners, pickles, dips, etches, phosphating solutions, and electrobrightners; analysis of plating salts and of water; physicochemical methods of analysis; preparation of standard solutions for volumetric analysis; and numerous tables.

5332 Electroplating for the Metallurgist, Engineer and Chemist. J. B. Mohler and H. J. Sedusky. 257 pages. 1951. Chemical Publishing Co., New York. (TS670 M72e)

Considers fundamentals of the above. Discusses a number of plating baths. Chapter references.

See also:

5113 (weld deposition on Bessemer steels)
5118 (electrolysis of Molten Cu_2Cl_2)
5119 (electrolysis of $NiCl_2$)
5158 (vacuum deposition of metals)
5555 (corrosion resistance of Cr-Ni electrodeposits)
5578 (painting decreases embrittlement)
5579 (corrosion-preventive coatings for oil-well tubing)
5783 (oxide coatings on metals)
6151 (electrode phenomena of Ni and Pt)
6375 (strength properties of organic coatings on metals)
6395 (base paints for protection of Mg alloys)
6777 (metal-plated fabric)

10. METALLOGRAPHY AND PRIMARY STRUCTURES

5333* The Structure of the Zeta Phase in the Silver-Zinc System. (In English.) I. G. Edmunds and M. M. Qurashi. *Acta Crystallographica*, v. 4, Sept. 1951, p. 417-425.

Above structure for 50 at. % Ag was determined from X-ray powder photographs, using a modified form of the method of steepest descents. Results are comprehensively presented, using tables and graphs.

5334* The Crystal Structure of the β-Phase of Uranium. (In English.) Charles W. Tucker, Jr. *Acta Crystallographica*, v. 4, Sept. 1951, p. 425-431.

Above was deduced from X-ray diffraction measurements made on single crystals of the phase retained in an alloy containing 1.4 at. % Cr and rapidly cooled from 720°C. The low symmetry and complexity of the structure accounts for the rather hard, brittle nature of the phase. Interrelations between the α, β and γ phases of the metal are clear from the β-phase crystal structure, but the precise mechanism of the transformations has not yet been studied. 10 ref.

5335* The Structure of NiSi. (In English.) Karel Toman. *Acta Crystallographica*, v. 4, Sept. 1951, p. 462-464.

Above structure was determined from Weissenberg and rotating-crystal photographs using CuKα radiation. Dimensions of the unit cell were determined by the powder method.

5336* Twinning and Slip in α-Uranium. (In English.) R. W. Cahn. *Acta Crystallographica*, v. 4, Sept. 1951, p. 470-471.

A study was made of the crystallographic elements of twinning and slip in the orthorhombic (low-temperature) form of uranium. The experiments were carried out with coarse-grained metal made by recrystallization after a small extension. A special precision back-reflection X-ray camera was used, by means of which it was possible to obtain Laue patterns from grains previously selected under a polarizing microscope.

5337* Interpretation of a New Structure for Silicon Carbide, "Si C VII." (In Russian.) E. B. Gasilova, M. S. Beletskii, and M. I. Sokhor. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 1, 1952, p. 57-60.

X-ray studies on powdered SiC were made. Data are tabulated and discussed. The existence of a 7th crystalline modification of the compound is claimed. Lattice parameters are tabulated.

5338* One Case of the Observation of Electron Diffraction From Gaseous Molecules. (In Russian.) A. I. Andrievskii and I. V. Kutovyi. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 11, 1952, p. 225-228.

Conditions for obtaining the above are described. Examples are illustrated. Data are charted for Cu_2O, CdO, and Cd_2O; on the basis of which crystal-structure parameters for Cd and Cu are tabulated.

5339* Interpretation of the Crystal Structure of "SiC VIII." (In Russian.) E. B. Gasilova and M. I. Sokhor. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 11, 1952, p. 249-251.

An X-ray study was made of SiC. Data are tabulated and briefly discussed. An 8th type of structure is claimed to exist.

5340* Crystal Structure of the Cu_2Cd Phase. (In Russian.) P. P. Kripiakevich, E. I. Gladyshevskii, and E. E. Cherkashin. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 11, 1952, p. 253-256.

X-ray data on the above are presented. The structure is shown to be the same as that of Zn_2Mg. 12 ref.

5341 The In—In_2S_3 System. M. F. Stubbs, J. A. Schufle, A. J. Thompson, and J. M. Duncan. *Journal of the American Chemical Society*, v. 74, Mar. 20, 1952, p. 1441-1443.

Presents phase diagram for the In-In_2S_3 system, obtained by thermal analysis, metallography, and X-ray studies. In_3S_5, In_5S_4, In_5S_6, and InS were found to exist, but not the previously reported In_2S.

5342* Observations on Drastically Quenched Iron-Carbon Melts. (In German.) Günter Falkenhagen and Wilhelm Hofmann. *Archiv für das Eisenhüttenwesen*, v. 23, Jan.-Feb. 1952, p. 73-74.

Brief discussion of X-ray and metallographic studies is illustrated by an X-ray diagram, photomicrographs, and tabular data. 11 ref.

5343 Study of Imperfections of Crystal Structure in Polycrystalline Materials: Low Carbon Alloy and Silicon Ferrite. J. J. Slade, Jr., and Sigmund Weissmann. *Journal of Applied Physics*, v. 23, Mar. 1952, p. 323-329.

The technique of the new X-ray double spectrometer method described in a former paper was applied to the study of angular misalignment of crystal structure in alloys. The specimens investigated include a low-carbon alloy annealed at 850°C. and 3 silicon ferrite samples annealed at 980, 1100, and 1200°C. The data show a significant dependence of crystal perfection on annealing temperature, and demonstrate clearly that angular misalignment of the coherently reflecting regions within the grains decreases with annealing temperature, provided this temperature is not excessive. Information on the influence of cold rolling on the subsequent annealing process was obtained. A mechanism of grain bending during plastic deformation is suggested and a relationship between magnetic properties, annealing temperature, and crystal perfection of silicon ferrite is pointed out.

5344 Lattice Parameters, Coefficients of Thermal Expansion and Atomic Weights of Purest Silicon and Germanium. M. E. Straumanis and E. Z. Aka. *Journal of Applied Physics*, v. 23, Mar. 1952, p. 330-334.

Data on the above are tabulated and discussed. 15 ref.

5345 Approximate Elastic Spectrum of β-Brass From X-Ray Scattering. H. Cole and B. E. Warren. *Journal of Applied Physics*, v. 23, Mar. 1952, p. 335-340.

The temperature diffuse scattering of X-rays from a single crystal of β-brass was measured at room temperature using a Geiger-counter spectrometer and crystal monochromated CuKα radiation. Measurements were made throughout a large region in reciprocal space, with special attention to the *hko* plane. Results are in excellent qualitative agreement with the theory developed by Laval and James in which temperature vibrations are expressed in terms of elastic waves. 10 ref.

5346 Physical Structure and Magnetic Anisotropy of Alnico 5. Parts I and II. R. D. Heidenreich and E. A. Nesbitt. *Journal of Applied Physics*, v. 23, Mar. 1952, p. 352-371.

Presents results of a combined electron-microscope and electron-diffraction study of the above. The experimental work substantially confirmed the physical picture established by the Kittel, Nesbitt, and Shockley theory. A new face-centered cubic precipitate, transitory in nature, was found which is essential in accounting for the alloy's permanent-magnet properties. Numerous micrographs, diagrams, and graphs. 18 ref.

5347 A New Superlattice in Co-Pt Alloys. A. H. Geisler and D. L. Martin. *Journal of Applied Physics*, v. 23, Mar. 1952, p. 375.

Structure of an alloy containing 30% Co was investigated. It was found by X-ray diffraction analysis that this alloy formed a superlattice of the type to be expected for Pt_3Co; it is face-centered cubic with Co atoms on the corner sites and Pt atoms on the face centers analogous to Cu_3Au. Heat treatment transformations resulting in formation of this phase are discussed.

5348* The Constitution of the Copper-Rich Copper-Zinc-Germanium Alloys. P. Greenfield and G. V. Raynor. *Journal of the Institute of Metals*, v. 80, Mar. 1952, p. 375-384.

Describes results of an investigation on the above. 20 ref.

5349 Joint Discussion on the Papers—Metallography of Carbon in Silicon-Iron Alloys Containing 4% Silicon, by E. D. Harry; The Variation in Electrical Properties of Silicon-Iron Transformer Sheet, by S. Rushton and D. R. G. Davies. *Journal of the Iron and Steel Institute*, v. 170, Mar. 1952, p. 232-237.

Papers published in Mar. 1951 issue.

5350 Joint Discussion on the Papers—The Crystal Structure of Graphite in Cast Iron, by W. S. Owen and B. G. Street; The Carbide Phase in Iron-Carbon-Silicon Alloys, by W. S. Owen. *Journal of the Iron and Steel Institute*, v. 170, Mar. 1952, p. 237-243.

Papers published in Feb. 1951 issue.

5351* New Data on the Crystalline Structure of the β-Phase of the Na-Pb System. (In Russian.) E. S. Makarov and Z. V. Popova. *Izvestiia Akademii Nauk SSSR*, Section of Chemical Sciences, July-Aug. 1951, p. 377-387.

X-ray study of the Na-Pb system indicated that the β-phase exists within the range 26.5-35.1 at. % Na. It has a cubic structure of the Cu_3Au type. Data are discussed, tabulated, and charted.

5352* An Investigation of Plasticity and Other Properties of Alloys in the Fe-Ni-Ta System. (In Russian.) K. A. Osipov. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, June 1951, p. 848-851.

Limits of the λ and γ solid solutions of the above system were determined by measuring electrical resistance, hardness, and a "bending" index. Data are discussed briefly and charted.

5353 Contribution to the Metal-Carbon-Boron Systems. Frank W. Glaser. *Journal of Metals*, v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 391-396.

Metal-carbon-boron powder mixtures were hot pressed and the resulting specimens studied by X-ray diffraction. It was found that, regardless of the starting composition, a metal boride phase was always the major component in these samples. Two new phases of the system Ti-B were found: Ti_2B and Ti_2B_5. The existence of a controversial face-centered cubic phase of formula TiB was confirmed. Electrical resistivities were measured for various boride phases. Tabular data. 19 ref.

5354 Lead-Uranium System. R. J. Teitel. *Journal of Metals*, v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 397-400.

The above system was investigated by X-ray, thermal, and microscopic analyses. Two pyrophoric intermetallic compounds were found: UPb_3 and UPb. The crystallographic structure of UPb_3 is reported. A phase diagram was drawn for the system showing 2 eutectic and one syntectic reaction. Photomicrographs and tables.

5355* The Electron Microscope in Metallurgy. (In German.) Hans Mahl. *Metall*, v. 6, Feb. 1952, p. 69-73.

Describes principal electron-microscopic methods of studying the surfaces of metals. Electron micrographs and diagrams are presented. 25 ref.

5356* Investigation of Aluminum-Titanium Alloys With High Titanium Content. W. Gruhl. (In German.) *Metall*, v. 6, Mar. 1952, p. 134-135.

Discusses the microscopic and radiographic investigation of a number of Al-Ti alloys with a Ti content of 50-80%. Results concerning the γ phase and the α solid solution are indicated. Micrographs illustrate the article.

5357* On the Platinum-Zinc and Platinum-Cadmium Systems. (In German.) H. Nowotny, E. Bauer, A. Stempft, and H. Bittner. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 83, Feb. 15, 1952, p. 221-236.

Metallographic, X-ray, magnetic, and thermoanalytical methods were used to establish the phases of above alloys. Zn and Cd were found to be highly soluble in Pt. Data are graphed and tabulated.

5358 Solubility of Carbon in 18-Percent-Chromium—10-Percent-Nickel Austenite. Samuel J. Rosenberg and Carolyn R. Irish. *Journal of Research of the National Bureau of Standards*, v. 48, Jan. 1952, p. 40-48.

A series of high-purity Fe-Cr-Ni alloys, of above base analysis, and with C ranging from 0.007-0.30%, was melted and solidified in vacuum. The presence or absence of carbides in these alloys after various mechanical and thermal treatments was determined by metallographic examination.

10. *Metallography and Primary Structures*

5359 A New Complex Eta-Carbide. A. Taylor and K. Sachs. *Nature*, v. 169, Mar. 8, 1952, p. 411.

During a recent examination of a complex iron-free, Ni-base alloy containing Co, Cr, Mo, and W; a microconstituent, thought to be a carbide, was extracted by electrolysis. The Debye-Scherrer pattern of the extract shown in the accompanying figure was closely analogous to that of a sample of Fe_4W_2C supplied by H. J. Goldschmidt; but its lattice parameter was very much lower. Chemical analysis revealed, in addition to Ni and C, the presence of appreciable amounts of Si, Cr, Co, W, Mo, and N_2. A structural formula was developed analogous to the complex high-speed steel η-carbide $Fe_3(W,MO)_3C$ reported by Goldschmidt in his review of the structure of carbides in alloy steels.

5360* The Distribution of Electrons Round Impurities in Monovalent Metals. J. Friedel. *Philosophical Magazine*, ser. 7, v. 43, Feb. 1952, p. 153-189.

Presents results of theoretical investigation of the above. Applications are made to dissolved H_2, where the impurity is a proton, and to atoms such as Zn, Ga, etc., which are usually considered to contribute their electrons to the conduction electrons. A detailed discussion is given of x-ray emission and absorption, the vacancy left in the X-ray shell being here treated as the positive impurity. In certain cases, quantitative predictions are made about the energies of X-ray absorption edges. 55 ref.

5361* Semi-Microradiography and Its Application to Aluminum Alloys. (In French.) Mladen Paic. *Revue de Métallurgie*, v. 49, Jan. 1952, p. 51-59.

Presents some theoretical principles and the technique of "semi-microradiography", as well as possibilities of the study of light alloys with respect to distribution of the components in cast Al alloys. Includes sketches and "semi-microradiographs". 28 ref.

5362* A Method for Investigation of Quaternary Systems, Illustrated by the Lead-Zinc-Cadmium-Tin System. (In German.) Erich Lindner. *Zeitschrift für Metallkunde*, v. 42, Dec. 1951, p. 377-387.

Describes representation of constitution of quaternary system by means of cuts which are parallel to two intersecting edges of a tetrahedron. Saturation limits of the separation occurring in the system while in the liquid state are indicated. Extensive tables and graphs.

5363* Crystal Structure of $PtPb_4$. In German.) Ulrich Rösler and Konrad Schubert. *Zeitschrift für Metallkunde*, v. 42, Dec. 1951, p. 395-400.

Gives details of the above, on the basis of the literature and of new experiments. Data on powder patterns using Cu-Kα radiation are tabulated. Shows relationship of structure of $PtPb_4$ to that of other binary alloys of the $CuAl_2$ family.

Miscellaneous Publications

5364 Contribution to Problem of Electrolytic Isolation of Carbide. P. Koch. Henry Brutcher, Translation 2749, 12 pages. From *Archiv für das Eisenhüttenwesen*, v. 22, nos. 5-6, 1951, p. 155-157.)

The carbides of a Mo steel were isolated with the aid of a meander-shaped current, and the most favorable electrical conditions for this process were determined. Emphasizes the maintainence of exact voltage in the process.

5365 On the Problem of Studying the Properties of Metals and Alloys At High Temperatures in Vacuo. N. T. Gudtsov, M. G. Lozinskii, I. F. Zudin, N. A. Bogdanov, and M. P. Matveeva. Henry Brutcher, Translation 2805, 26 pages. (From *Izvestiya Akademii Nauk SSSR*, Section of Technical Sciences, Jan. 1950, p. 108-125.)

Gives a description of procedure and apparatus for determining microstructure of metals and alloys by heating them within a wide range of temperatures, up to the melting point, in vacuo; measuring hardness up to 1830°F; and studying intensity of vaporization of metals and alloys in vacuo. Diagrams and micrographs.

Books

5366 Typical Microstructures of Cast Iron. 54 pages. 1951. British Cast Iron Research Assn., Alvechurch, Birmingham, England. (TN693I7 B77t)

Discusses constituents of cast iron; typical unalloyed cast irons; special and alloy cast irons; malleable cast irons; and some typical defects in iron castings. Includes excellent large-sized photomicrographs.

See also:

5088 (steel-ingot solidification and segregation)
5100 (crazing of ingot molds due to growth at inner surface)
5122 (crystal structure of open hearth skull)
5136 (nodular graphite in cast iron)
5192 (metallography of metal cutting)
5196 (effect of microstructure on tool life—book)
5247 (austenitic-ferrite welds at high temperature)
5267 (structure of carburized cases)
5272 (microstructure of steel—machining effects)
5326 (structure of vapor-deposited Fe)
5381 (diagram of Zr-Hf system)
5389 (microstructure of Al-Cu and Al-Zn alloys)
5441 ($Fe-H_2$ equilibrium)
5443 (microstructure of Cu alloys)
5450 (alloy systems—book)
5460 (microstructures of Mo-steel pipe)
5487 (recrystallized arc-cast and sintered Mo)
5497 (structure of cast-iron rolls)
5503 (microstructure vs. heat resistance of steel)
5514 (crystal structure of alloys—electronic theory)
6224 (atomic structure of Al crystals)

11. METALS—TRANSFORMATIONS AND RESULTING STRUCTURES

5367* The Question of the Migration of Austenitic Grain Boundaries. (In Russian.) M. G. Lozinskii. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 1, 1952, p. 53-56.

A study was made of the above. Apparatus is described and illustrated. Grain boundaries were observed to widen with increased temperature and with an increase of holding time at a given temperature.

5368 The Kinetics of Superstructural Transformations. (In Russian.) N. S. Akulov and Ia. I. Feldshtein. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 11, 1952, p. 221-223.

Presents a discussion of ordering and magnetic properties of binary alloys. Face-centered and body-centered structures are considered. Results are compared with experimental data for CoMn.

5369 Effect of Cold-Working on the Age-Hardening of Soft Steel. (In German.) Wolfgang Gruhl. *Archiv für das Eisenhüttenwesen*, v. 23, Jan.-Feb. 1952, p. 39-45; disc., p. 45-46.

Describes experiments which show that the specific electrical resistance of cold-worked and age-hardened steels decreases with degree of coldworking and that increasing the age-hardening temperature retards this resistance drop. This phenomenon is explained by reduced solubility of C and N_2 in the solid solution and by the re-formation of cementite and iron-nitride nuclei. Data are graphed. 29 ref.

5370* The Classical Picture of Recrystallisation After Work Hardening. D. I. Cameron. *Australasian Institute of Mining and Metallurgy, Proceedings*, new ser., Mar. 31-June 30, 1947, p. 15-30.

Covers outstanding questions concerning the recrystallization of mild steel. Emphasizes the necessity for careful examination of annealing conditions in the 550-750°C. range. Examines the area between hot work and cold work and experimental methods suggested for determining the effects of residual work-hardening from semi-hot work by the cold rolling-annealing process. The effect of prior partial anneals on inhibition of subsequent recrystallization was examined. A series of micrographs shows the progress of recrystallization in a selected field. 12 ref.

5371* Modes of Decomposition of the Ferrous Oxide Phase. (In French.) Robert Collongues and Georges Chaudron.

Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences, v. 234, Feb. 11, 1952, p. 728-729.

Describes experiments on the above as found in iron or steel. Results are discussed and illustrated by photomicrographs.

5372* Allotropic Transformations of Strontium. (In French.) Émile Rinck. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Feb. 19, 1952, p. 845-847.

Existence of 3 allotropic modifications of Sr with transformation points at 235 and 540°C. was determined by thermal analysis, electrical resistivity, differential thermoelectric, and expansion measurements on a specimen of redistilled pure Sr. Includes graph.

5373 The Relationship of Alpha and Beta Silicon Carbide. Henry N. Baumann, Jr. *Journal of the Electrochemical Society*, v. 99, Mar. 1952, p. 109-114.

Silicon carbide was formed under various time-temperature conditions from mixtures of SiO_2 and C and of Si and C. The products were examined by x-ray diffraction, electron and optical microscopy, and chemical analysis. Results are presented and discussed. Photomicrographs and tabular data.

5374* The Effect of the Elements of the First Long Period on the $\alpha \rightleftarrows \beta$ Transformation in Titanium. A. D. McQuillan. *Journal of the Institute of Metals*, v. 80, Mar. 1952, p. 363-368.

The method is which the H_2 pressure in equilibrium with an extremely dilute solution of H_2 in a Ti-rich alloy is measured as a function of temperature in order to follow the phase transformations occurring in the alloy, described in a previous paper (v. 79, p. 73+), was used for a systematic investigation of the effects of V, Cr, Mn, and Ni, and Co on the above transformation. The maximum amount of each addition element was approximately 5 at %. Graphs and micrographs.

5375* Micrographic Aspects of the Diffusion of Zinc and Aluminium in Copper. H. Bückle and J. Blin. *Journal of the Institute of Metals*, v. 80, Mar. 1952, p. 385-389.

Discusses the above. Various possible explanations of the phenomenon are considered. The authors favor the one which assumes the existence of 2 different mechanisms of diffusion of the atoms of the alloying elements, proceeding concurrently. 20 ref.

5376 The Structure of Carbides in Alloy Steels. Part II. Carbide Formation in High-Speed Steels. H. J. Goldschmidt. *Journal of the Iron and Steel Institute*, v. 170, Mar. 1952, p. 189-204.

An X-ray investigation carried out on filings and electrolytic carbide extracts of high-speed 18-4-1 type steels showed that, apart from the austenite-martensite transformation, a variety of changes in carbide structure can occur on hardening and tempering and with varying alloy content. 20 ref.

5377 Diffusion of Hydrogen in Iron and Iron Alloys at Elevated Temperatures. P. L. Chang and W. D. G. Bennett. *Journal of the Iron and Steel Institute*, v. 170, Mar. 1952, p. 205-213.

Effects of Cr, Ni, and Mo on the rate of H_2 permeation in Fe were investigated. Cr has little effect on permeation in the γ range but greatly reduces the rate of permeation in the α range. Ni and Mo have little effect. The permeation equation was re-examined. Graphs and tabular data. 19 ref.

5378 Joint Discussion on the Papers—Structural Transformations in the Tempering of High-Carbon Martensitic Steels, by K. H. Jack; Magnetic Analysis of Iron-Carbon Alloys: The Tempering of Martensite and Retained Austenite, by J. Crangle and W. Sucksmith. *Journal of the Iron and Steel Institute*, v. 170, Mar. 1952, p. 248-255.

Papers published respectively in June and Sept. 1951 issues.

5379* Transformation Diagrams and the Hardenability of Alloy Steels. W. Steven. *West of Scotland Iron and Steel Institute Journal*, v. 58, 1950-51, p. 221-249.

Those features of the formation of pearlite, bainite and martensite pertinent to studies of hardenability are reviewed. Mechanical properties of the different structures are compared; and it is pointed out that those of tempered martensite are independent of chemical composition only in a very restricted sense. The limited extent to which information relevant to continuous cooling can be derived from isothermal transformation diagrams is discussed and the potential importance of experimentally determined continuous cooling diagrams is emphasized. 25 ref.

5380 Cathodic Sputtering for Micro-Diffusion Studies. Thomas F. Fisher and C. E. Weber. *Journal of Applied Physics*, v. 23, Feb. 1952, p. 181-183.

Describes a method for uniform removal of micro-layers of metal from cylindrical specimens based on sputtering of the metal from the cathode of a glow-discharge tube. Technique is applicable to diffusion studies, with advantages over more common methods. Tables.

5381 The Allotropic Transformation of Hafnium and a Tentative Equilibrium Diagram of the System Zirconium-Hafnium. J. D. Fast. *Journal of Applied Physics*, v. 23, Mar. 1952, p. 350-351.

Temperature of the above transformation is at least 550°C. higher than the value recently reported by Duwez. A tentative equilibrium diagram of the system is given.

5382 Diffusion in Grain Boundaries. M. H. Dawson, M. R. Achter, and R. Smoluchowski. *Journal of Applied Physics*, v. 23, Mar. 1952, p. 373-374.

Two "Letters to the Editor." Dawson points out that the work of Achter and Smoluchowski on diffusion in grain boundaries may really be a study of grain-boundary precipitation as a function of solute supersaturation and orientation difference at grain boundaries.

5383 Diffusion of Indium Into Gallium Near the Melting Point. R. E. Eckert and H. G. Drickamer. *Journal of Chemical Physics*, v. 20, Mar. 1952, p. 532.

Data are briefly charted, tabulated, and discussed.

5384* Theory and Observations on Helicoidal Growth on the (0001) Faces of Silicon Carbide. (In French.) S. Amelinckx. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 48, Nov.-Dec. 1951, p. 475-484.

Discusses a new theory of crystal growth based on the presence of dislocations in the crystal lattice. According to this theory, growth fronts develop in the spiral. Theory and results of a microscopic and interferometric study of (0001) faces of silicon carbide are presented. The difference of level between 2 successive growth fronts was measured by means of an interferometric technique. Includes micrographs, diagrams, and tables. 18 ref.

5385 Isothermal Transformation Characteristics of an Iron-Chromium Alloy of Titanium. Charles W. Phillips and Donald N. Frey. *Journal of Metals*, v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 381-385.

Discusses and presents results of a study of the behavior of commercial Ti-Fe-Cr alloy, Ti-150, during heat treatment. It exhibits a martensitic transformation on cooling, also two nucleation and growth reactions. The reactions were followed by metallographic, X-ray diffraction, and microhardness methods. Graphs and photomicrographs.

5386 Use of Etch Figures for Micrographic Investigations of Commercially Pure Aluminum and Aluminum Alloys. Jean Herenguel. *Journal of Metals*, v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 385-386.

Describes above method. Illustrates typical results.

5387 Origin of Porosity in Castings of Magnesium-Aluminium and Other Alloys. E. J. Whittenberger and F. N. Rhines. *Journal of Metals*, v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 409-420.

The formation of casting porosity is viewed as a nucleation and growth process with solidification shrinkage and gas precipitation as cooperative driving forces. Experimental evidence evaluating the individual contribution of each force confirms the major premise that microporosity is nucleated by gas precipitation. Additional data disclose the effects of identity and quantity of gas, temperature range of freezing; and of

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freezing rate upon amount and distribution of porosity in light-metal castings. Graphs, sketches, and microradiographs. 17 ref.

5388* Refining, Tempering, and Reversion of 4% Al-Cu, Al-Cu-Mg, and Al-Cu-Mg-Si High-Purity Alloys. (In French.) A. Saulnier and R. Syre. *Revue de Métallurgie*, v. 49, Jan. 1952, p. 1-19; disc., p. 20-21.

Discusses structural hardening with respect to theories of precipitation, objections to these theories, isothermal hardening of high purity 4% Al-Cu alloys, isothermal expansion, reversion, influence of Mg on Al-Cu alloys, hardening of Al-Cu-Mg alloys, etc. Includes micrographs, tables, and graphs. 23 ref.

5389* Influence of Different Factors on the Kinetics of the Structural Hardening of Aluminum-Copper and Aluminum-Zinc Solid Solutions. (In French.) A. Berghezan. *Revue de Métallurgie*, v. 49, Feb. 1952, p. 99-113.

The above was investigated with respect to rate of annealing, method of recrystallization prior to tempering, mechanical and thermal treatments after tempering, and the relation between variation of mechanical properties and microstructure. Includes charts and micrographs. 25 ref.

5390* Study of the Martensitic Transformation in Austenitic Cast Iron. (In French.) P. Laurent and M. Batisse. *Revue de Métallurgie*, v. 49, Feb. 1952, p. 129-139.

The austenite-martensite transformation was studied for 3 normally austenitic castings. It was observed that the formation of martensite facilitates subsequent graphitization, and that an austenite micrographically distinct from the original austenite is produced. Includes tables, charts, and micrographs.

5391* Influence of Mechanical and Thermal Treatments Prior to Critical Cold Working on Recrystallization of Iron. (In French.) Michel Mouflard and Paul Lacombe. *Revue de Métallurgie*, v. 49, Feb. 1952, p. 140-144.

Describes experiments on the above. Results are tabulated, charted, and illustrated by macrographs.

5392* The Lamellar Growth of Crystals. II. The Growth Mechanism of Crystals Which Are Not Close to Phase Equilibrium. (In German.) Ludwig Graf. *Zeitschrift für Metallkunde*, v. 42, Dec. 1951, p. 401-409.

Reviews the above on the basis of the literature and further experiments. The mechanism of crystal growth is described in detail. 32 ref.

Miscellaneous Publications

5393 The Nucleation of the Solid. J. H. Hollomon and D. Turnbull. American Institute of Mining and Metallurgical Engineers, "The Solidification of Metals and Alloys," 1951, p. 1-19; disc., p. 19-23. (QC303 AM35s)

Discusses mechanism of the above at length. By studying rate of solidification of dispersed samples of mercury over a very narrow temperature range, rate of nucleation as a function of time and temperature in the absence of impurities was measured. The observed nucleation rate is in good quantitative agreement with that predicted from the theory of nucleation now demonstrated to be correct quantitatively for the liquid-solid transition. 27 ref.

5394 The Growth of Metal Crystals. Robert F. Mehl. American Institute of Mining and Metallurgical Engineers, "The Solidification of Metals and Alloys", 1951, p. 24-49; disc., p. 49-51. (QC303 Am35s)

Presents elementary facts and ideas concerning the growth of crystals, especially of metals. Treats of the growth of nuclei to large crystals. Includes numerous diagrams and micrographs, which illustrate the concepts discussed, and a selective bibliography.

5395 The Solidification of Steel Ingots. B. R. Queneau. American Institute of Mining and Metallurgical Engineers, "The Solidification of Metals and Alloys", 1951, p. 52-68; disc., p. 68-73. (QC303 Am35s)

Comprehensive discussion of various factors involved in the above is used to coordinate and illustrate the principles discussed in the other papers in this book. Includes numerous macrographs, tables, diagrams, and graphs. 11 ref.

5396 Influence of Carbon Upon the Self-Diffusion of Iron. P. L. Gruzin, Yu. V. Kornev, and G. V. Kurdyumov. Henry Brutcher, Translation 2808, 7 pages. (From *Doklady Akademii Nauk SSSR*, new ser., v. 80, Sept. 1, 1951, p. 49-51.)

Previously abstracted from original.

Books

5397 The Solidification of Metals and Alloys. 73 pages. 1951. American Institute of Mining and Metallurgical Engineers, New York. (QC303 Am35s)

Consists of preface by Cyril Stanley Smith, plus 3 papers and accompanying discussion presented by an AIME symposium, Feb. 12, 1950. Individual papers are separately abstracted.

See also:

5159 (nodular graphite formation in cast iron)
5292 (diffusion in electroplating)
5336 (twinning in α-uranium)
5347 (heat-treatment transformations in Co-Pt alloys)
5441 (cathodic saturation of Fe with H_2)
5450 (transformations of alloys—book)

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5398 Dissolving Velocity of Metals in Deutero-Electroytes. (In English.) J. Brun. *Acta Chemica Scandinavica*, v. 5, nos. 9-10, 1951, p. 1402-1404.

Reports on experiments dealing with the dissolution of Zn, Al, and Fe in acids and bases, the hydrogen content of which has been partly or completely replaced by deuterium. Data are tabulated.

5399* Thermal Expansion Coefficients of α-Monoclinic Selenium. (In English.) Clarence J. Newton and Malcolm Y. Colby. *Acta Crystallographica*, v. 4, Sept. 1951, p. 447.

Results of determination of the above by X-ray diffraction methods are tabulated.

5400* The Problem of Minimum Resistance of Magnesium at Low Temperatures. (In Russian.) L. S. Kan and B. G. Lazarev. *Doklady Akademii Nauk SSSR*, new ser., v. 81, Dec. 21, 1951, p. 1027-1029.

The resistance of Mg of high purity (99.99%) was measured at low temperatures (down to 1.325°K.). The method of preparation and testing is described. Data are discussed and charted.

5401* Impulse Method for Determining Heat Capacity (In Russian.) V. I. Khotkevich and N. N. Bagrov. *Doklady Akademii Nauk SSSR*, new ser., v. 81, Dec. 21, 1951, p. 1055-1057.

Describes method developed for measuring the heat capacity of metals in wire form. The apparatus is described and typical curves are illustrated.

5402* Influence of Oxygen Adsorbed on Platinum on the Variation of Contact Potential. (In Russian.) T. V. Kalish and R. Kh. Burshtein. *Doklady Akademii Nauk SSSR*, new ser., v. 81, Dec. 21, 1951, p. 1093-1096.

The above was investigated over the range 20-800°C. Data are discussed and charted.

5403* Thermomagnetic Effect in FePt Alloy. (In Russian.) R. G. Annaev and M. V. Kolodin. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 11, 1952, p. 697-700.

The effect of ordering (annealing temperature) and strength of the magnetic field on the above was studied. Data are discussed and charted. 10 ref.

5404 The Solubility of Cadmium in Mixtures of Cadmium Chloride With Other Chlorides. Daniel Cubicciotti. *Journal of the American Chemical Society*, v. 74, Mar. 5, 1952, p. 1198-1200.

Solubility of Cd in mixtures of $CdCl_2$ with the chlorides of K, Ca, Ce, Mn, Mg, and Zn was determined at 740°C. Addition of any of these salts reduced the solubility. Effectiveness in reducing solubility is compared with anion-to-cation ratio of the salt and electropositiveness of the metal of the cation.

5405 Vapor Pressures of Inorganic Substances. VIII. Molybdenum Between 2151 and 2462°K. James W. Edwards, Herrick L. Johnston, and Paul E. Blackburn. *Journal of the American Chemical Society*, v. 74, Mar. 20, 1952, p. 1539-1540.

Includes values calculated for heat of sublimation at absolute zero and equations formulated for vapor pressure as a function of temperature. 12 ref.

5406 Hall Effect and Ponderomotive Force in Simple Metals. Norman Rostoker. *American Journal of Physics*, v. 20, Feb. 1952, p. 100-107.

The Bloch-Sommerfeld theory of conductivity was applied to the calculation of momentum lost by conduction electrons because of collisions with the crystal lattice. The calculations provide the basis for a microscopic interpretation of the ponderomotive force.

5407 Determination of Thermal Conductivity of Copper and Deoxidized Copper-Iron Alloys; Apparatus and Technique. M. J. Goglia, G. A. Hawkins, and J. E. Deverall. *Analytical Chemistry*, v. 24, Mar. 1952, p. 493-496.

Describes a small laboratory apparatus for use in measuring thermal conductivity of Cu specimens containing small amounts of Fe. Apparatus is also suitable for studies in connection with other metals. Gives data for temperatures of 150, 300, and 500°F. Tables, chart, and apparatus diagram.

5408* Changing the Electrical Resistance of Pure Metals at the Melting Point. (In German.) Horst Gerstenkorn. *Annalen der Physik*, ser. 6, v. 10, Jan. 1, 1952, p. 49-79.

Shows that, if the metal is in the molten state, X-ray structure investigations must replace the mathematical method of establishing probable electron dispersion and thus its electrical resistance. The method described permits determination of absolute specific resistance of solid and molten metals and the accurate liquid-solid resistance ratio at the melting point. Application to Li, Na, and K is described. 16 ref.

5409* Development of Processes for Testing Ferromagnetic Materials. (In German.) Werner Jellinghaus. *Archiv für das Eisenhüttenwesen*, v. 22, Nov.-Dec. 1951, p. 401-410.

Reviews the above on the basis of the literature. Discusses in particular permeability measurements of magnetically soft materials, measurement of the magnetic properties of permanent magnetic materials, and of magnetostriction. 54 ref.

5410* Differences in Behavior of Ferromagnetic Substances in Small Magnetic Fields and in the Unmagnetic State. (In German.) Hermann Fahlenbrach. *Archiv für das Eisenhüttenwesen*, v. 23, Jan.-Feb. 1952, p. 47-51.

Cites experimental examples which show that the externally nonmagnetic behavior of a ferromagnetic substance depends on the method of demagnetization. An attempt is made to explain the differences in behavior after demagnetization by shock, and suitable annealing. Data are charted. 13 ref .

5411* Research on Suitable Compositions of Permanent-Magnet Steels Containing About 4% Cr, 2% Co, and 0.5% W (Co 040). (In German.) Walter Knorr. *Archiv für das Eisenhüttenwesen*, v. 23, Jan.-Feb. 1952, p. 53-55; disc., p. 55.

On the basis of 41 melts, effects of C, Cr, Co, W, and Co+W on magnetic properties of above steels were investigated. Co and W were found to have the greatest effect. Recommended composition is indicated. Data are graphed and tabulated.

5412* Some Measurements of the Total Emissivity of Metals and Pure Refractory Oxides and the Variation of Emissivity With Temperature. A. H. Sully, E. A. Brandes, and R. B. Waterhouse. *British Journal of Applied Physics*, v. 3, Mar. 1952, p. 97-101.

A method is described for rapid determination of the total emissivity of metals and oxides in the range 300-800°C. Values were obtained for lampblack and polished Pt and also for Nimonic 75, pure Ni, and stainless steel, having various surface conditions. The total emissivities of the pure oxides ceria, zirconia, thoria, magnesia, alumina, and fused silica were also determined. Effect of particle size of the oxides and of variation of emissivity with angle of emission was studied. 10 ref.

5413* Vibration Frequencies in Diatomic Molecules and in Solid Metals. E. C. Baughan. *Transactions of the Faraday Society*, v. 48, Feb. 1952, p. 121-128.

An empirical generalization is pointed out between the Debye frequencies of metallic solids and diatomic molecular vibration frequencies predicted by a formula due to Guggenheimer. Some implications for the theory of metallic valency are discussed. Data are tabulated. 18 ref.

5414* Nitrogen and Ethylene Adsorption on Evaporated Tungsten Films. B. M. W. Trapnell. *Transactions of the Faraday Society*, v. 48, Feb. 1952, p. 160-165.

The chemisorption of nitrogen and ethylene by clean evaporated tungsten films is described, together with the chemisorption of H_2 into adsorbed layers of these gases and of O_2. Results show that the poisoning of the catalytic parahydrogen conversion by ethylene and oxygen layers is due to simple blockage or surface sites, while poisoning by nitrogen layers is due to reduction in the condensation coefficient of hydrogen. 11 ref.

5415* New Method Which Permits Measurement of Hall Effect in Series and in Parallel. (In French.) A. L. Perrier. *Helvetica Physica Acta*, v. 24, Dec. 31, 1951, p. 637-641.

Describes and diagrams above method, indicating advantages over the traditional method.

5416 Mercury; the Purest Metal. J. B. Lawrence. *Instruments*, v. 25, Mar. 1952, p. 310-312, 363.

When is mercury clean? How is mercury cleaned? Why does skin re-form on "clean" mercury? Answers to these questions are given.

5417 Type 416 Retains Magnetic Properties at 450°F. R. H. Esling. *Iron Age*, v. 169, Mar. 20, 1952, p. 106-108.

Type 416 stainless steel was investigated for use in a controller governing a high-temperature, high-pressure corrosive-fluid system. It was found that this alloy's magnetic properties undergo no significant change. Amount of hysteresis is slightly decreased at 450°F. A specially designed, Fahy-type permeameter was used in tests. Data are tabulated and graphed.

5418* Experimental Confirmation of Electrochemical Theory of Liquid Alloys in the Iron-Carbon-Silicon System. (In Russian.) O. A. Esin and L. K. Gavrilov. *Izvestiia Adademii Nauk SSSR*, Section of Technical Sciences, Aug. 1951, p. 1234-1242.

The emf's. developed between pairs of molten alloys of the above system were determined. The data are discussed, tabulated, and charted for alloys containing 0.65-43.0% Si and 0.20-4.48% C.

5419* A Modified Dew-Point Method for Vapour-Pressure Measurements of Lead-Mercury Alloys. B. R. Burgan, R. C. Hall, and R. F. Hehemann. *Journal of the Institute of Metals*, v. 80, Mar. 1952, p. 413-414.

Describes the above. The vapor pressure of mercury over several Pb-Hg alloys covering a wide range of composition was determined for a range of temperatures. The activities of Hg and of Pb were calculated for 324°C., and found to agree well with the results of Hildebrand, Foster, and Beebe.

5420 The Thermal Conductivity of Metals at High Temperature. C. L. Hogan and R. B. Sawyer. *Journal of Applied Physics*, v. 23, Feb. 1952, p. 177-180.

Describes a modification of the Forbes bar method for above in the range 25-1000°C. A mathematical analysis is presented. Electrical and thermal conductivities of commercial "A" nickel, Inconel, several stainless-steels, and 1010 steel are reported.

5421 Secondary Electron Emission From Metals Under Positive Ion Bombardment in High Extractive Fields. E. W. Webster, R. J. Van de Graafe, and J. G. Trump. *Journal of Applied Physics*, v. 23, Feb. 1952, p. 264-266.

As part of a study of breakdown mechanisms in high vacuum, experiments on the above, with hydrogen ions, show that emission is small and increases only slowly with the electric field strength at the bombarded surface. Results are plotted for steel wires and both H_1^+ and H_2^+ ions.

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5422 Domain Structure of Perminvar Having a Rectangular Hysteresis Loop. H. J. Williams and Matilda Goertz. *Journal of Applied Physics*, v. 23, Mar. 1952, p. 316-323.

An investigation was made of the above for a Perminvar containing 43% Ni, 34% Fe, and 23% Co. Effect of superimposing an applied alternating field was also investigated, and an effective permeability of 4,000,000 was obtained. 14 ref.

5423 Magnetic Behavior of Intermediate Phases in Alloys of Transition Elements. P. A. Beck. *Journal of Metals*, v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 420.

Sigma-phase specimens of the following compositions were tested: 40-40-20 Fe-Cr-Mo; 35-35-30 Fe-Cr-Mo; 48.7-50.2-1.1 Fe-Cr-W; and 40.7-59.3 Co-Cr (all atomic percentages). All were paramagnetic at room temperature, but only the first alloy became ferromagnetic at liquid-N_2 temperatures.

5424* New Highly Coercive, High-Permeability, High-Loss Ferromagnetic Materials. (In French.) Charles Guillaud. *Journal des Recherches du Centre National de la Recherche Scientifique*, Dec. 1951, p. 69-87.

Presents a general review of the above, discussing experiments with magnets produced by casting and by powder metallurgy; with Fe-Si, Fe-Ni, Fe-Mn, and Fe-Co-Ni alloys; and with ferrites. Surveys applications. Includes tables, diagrams, and graphs. 45 ref.

5425* Metallic Conduction—The Internal Size Effect. An Addendum. D. K. C. MacDonald. *Philosophical Magazine*, ser. 7, v. 43, Jan. 1952, p. 124-125.

Briefly discusses the Hall effect in metals at low temperatures, especially those exhibiting the anomalous minimum of electrical resistance.

5426* The Specific Heats of Germanium and Grey Tin at Low Temperatures. R. W. Hill and D. H. Parkinson. *Philosophical Magazine*, ser. 7, v. 43, Mar. 1952, p. 309-316.

The above were measured from liquid helium temperatures to 170 and 110°K., respectively. Shows that previous data on Ge are not valid for pure material, and that temperature variations of the Debye characteristic temperatures of these elements are very large. Enthalpy, entropy, and free-energy values are tabulated. 13 ref.

5427* A Calculation of the Cohesive Energies and Pressure/Volume Relations of the Divaient Metals. S. Raimes. *Philosophical Magazine*, ser. 7, v. 43, Mar. 1952, p. 327-337.

A method is described for calculating the energy of the lowest state of a divalent metal, which renders unnecessary explicit calculation of an ion-core field. An expression for total energy of valence electrons is obtained, and applied to calculation of atomic radii, compressibilities, and cohesive energies. Calculated change of volume for up to 100,000 kg. per sq. cm. agree with the experimental data of Bridgman. Data for Mg, Ca, Sr, Ba, Zn, Cd, and Be are charted and tabulated.

5428 Intrinsic Magnetization in Alloys. W. J. Carr, Jr. *Physical Review*, ser. 2, v. 85, Feb. 15, 1952, p. 590-594.

The intrinsic magnetization of alloys among the iron transition group of metals is explained using a Heitler-London model for the *3d* electrons. The magnetic moment associated with each atom is determined by the principle of maximum spin and the sign of the interaction between neighboring parts from the overlap of the wave functions. It is found that a large number of alloys derive their spontaneous magnetization from an antiparallel arrangement of atomic spins.

5429 Properties of Thermally Produced Acceptors in Germanium. C. S. Fuller, H. C. Theuerer, and W. van Roosbroeck. *Physical Review*, ser. 2, v. 85, Feb. 15, 1952, p. 678-679.

Briefly discusses and presents experimental data on the *p-n* transformation of Ge. Graphs show variation of acceptor concentration with temperature and calculated and observed values of resistivity.

5430 The Formation of a Boundary Between Normal-Conducting and Superconducting Metal. M. P. Garfunkel and B. Serin. *Physical Review*, ser. 2, v. 85, Mar. 1, 1952, p. 834-840.

An experiment is described in which a superconducting sample is arranged so that part of it is in the normal state and part of it is superconducting. The boundary surface is thus a single, large area rather than the complicated boundaries that exist between normal and superconducting regions when a sample is in the intermediate state. It was found that there is a large difference between the magnetic field at which the superconducting-normal state transition occurs and the magnetic field at which the normal-state-superconducting transition occurs. These results are in agreement with the thermodynamic theory of phase transition. This theory, coupled with an assumption about the nature of the surface energy between superconducting and normal metal, is used to show how hysteresis determines the ratio of this surface energy to a characteristic dimension of the superconductor. A measure of this ratio is given between 3.37 and 3.68°K. for superconducting tin. 17 ref.

5431 The Origin of High Permeability in Permalloy. Soshin Chikazumi. *Physical Review, ser.* 2, v. 85, Mar. 1, 1952, p. 918-919.

It is well known that alloys of the composition near Ni_3Fe have unusual magnetic properties sensitive to heat treatment. These properties were investigated in connection with formation of a superlattice at 490°C., and explained in terms of "directional order". Micrographs show domain patterns.

5432 Resistivity of Evaporated Tellurium Films. Takemaro Sakurai and Seiji Munesue. *Physical Review*, ser. 2, v. 85, Mar. 1, 1952, p. 921.

A Te film was made on a substrate of a silica plate by vacuum evaporation, and its resistivity measured at various temperatures. The thickness of film was varied from 200 to 5000 A. Results are charted and discussed.

5433 Conductivity of Cold-Worked Metals. D. L. Dexter. *Physical Review*, ser. 2, v. 85, Mar. 1, 1952, p. 936-937.

In a recent paper, Landauer computed the change in conductivity using as a scattering potential the energy of the bottom of the conduction band, calculated from free-electron theory, in a lattice containing a single edge-type dislocation. This note extends and modifies these results. Effect of singularity in the assumed scattering potential is discussed.

5434 On the Theory of Electrical Conductivities of Monovalent Metals. A. B. Bhatia. *Proceedings of the Physical Society*, v. 65, sec. A, Mar. 1, 1952, p. 188-191.

A theoretical and mathematical treatment of the above.

5435 Density of States Curve for the *3d* Electrons in Nickel. G. C. Fletcher. *Proceedings of the Physical Society*, v. 65, sec. A, Mar. 1, 1952, p. 192-202.

A calculation was made of the energy density of electronic states for the above, using the approximation of tight binding. Theoretical basis of the approximation is outlined and validity of the underlying assumptions examined. Required overlap integrals are evaluated and the secular equation for energy as a function of wave vector is solved exactly over the energy range of interest for Ni. The density-of-states curve is computed graphically.

5436 Anomalous Thermal Conductivity of Pure Metals at Low Temperatures. J. K. Hulm. *Proceedings of the Physical Society*, v. 65, sec. A, Mar. 1, 1952, p. 227-228.

Analyzes work recently reported on the thermal and electrical conductivities of Na at low temperatures, by Berman and Macdonald (1951). Attention was drawn to two types of discrepancy between their experimental data and the behavior predicted by the electron theory of metals. Points out that the discrepancy for Na at the lowest temperatures is essentially of the same type as that already well known for 10 other metals, and originates in the fact that the observed coefficient of the T^2 term in the electronic thermal resistivity is nearly an order of magnitude lower than the theoretical value. Placing of special emphasis on Lorenz number for Na tends to obscure the fact that it is in the thermal resistivity rather than in the electrical resistivity that the main discrepancy occurs. 10 ref.

5437 A Note on the Structure of Selenium. E. Billig. *Proceedings of the Physical Society*, v. 65, sec. B, Mar. 1, 1952, p. 216-221.

Reviews recent work, mainly on single crystals, with a view to clarifying the electrical conductivity of Se.

5438 Electronic Structures and Physical Properties in the Alloy Systems Nickel-Copper and Palladium-Silver. B. R. Coles. *Proceedings of the Physical Society*, v. 65, sec. B, Mar. 1, 1952, p. 221-229.

A comparison is made of the magnetic, electrical, and thermoelectric properties of alloys in the 2 systems; and the lattice spacings, optical properties, electronic specific heat, and X-ray spectroscopy of the Ni-Cu alloys are also considered.

5439 Torque Curves and Other Properties of Permanent Magnet Alloys. K. Hoselitz and M. McCaig. *Proceedings of the Physical Society*, v. 65, sec. B, Mar. 1, 1952, p. 229-235.

Further investigations of Alcomax III and related alloys were made using a torque magnetometer. Torque curves were obtained after various sequences of heat treatment designed to throw light on the changes that occur in these alloys, and the magnitude and direction of the magnetic field applied during cooling was varied. A method of deriving 3 independent constants of crystal anisotropy without using single crystals was devised.

5440* Progress in Knowledge Concerning the Metallic State: "Exo-Electrons." (In French.) J. Bergier and F. Le-Lionnais. *Revue Générale des Sciences pures et appliquées*, v. 58, Nov. 11, 1951, p. 341-349.

Presents a general review of a new type of electron emission which occurs when an allotropic transformation releasing energy takes place in a metal. Various techniques and results of experiments are described.

5441* Role of Thermal, Mechanical, and Surface Treatments in the Cathodic Charging of Iron With Hydrogen. (In French.) Jean Duflot. *Revue de Métallurgie*, v. 49, Jan. 1952, p. 35-50.

Discusses the above with respect to permeability of Armco iron for H_2 at room temperature, solubility of H_2 in Fe, the Fe-H_2 equilibrium, and the behavior of Fe when its H_2 content is as large as possible. Apparatus is described and diagrammed. Results are tabulated, charted, and illustrated by micrographs.

5442* Radiofrequency Measurement of Surface Layers on Metals. (In French.) R. G. Chambers. *Revue de Métallurgie*, v. 49, Jan. 1952, p. 65-66.

Presents a short discussion of results of some measurements dealing with the resistivity of surface layers of metals at high frequency and low temperature.

5443* Highly Conductive Alloys. W. W. Kee. *Revue de Métallurgie*, v. 49, Feb. 1952, p. 89-98.

Discusses 2 groups of Cu alloys—those which can be heat treated and those which cannot, with respect to their electrical conductivity, mechanical properties, and microstructure.

5444* Influence of Cobalt on the Properties of Cementite. (In French.) A. Michel and J. Drain. *Revue de Métallurgie*, v. 49, Feb. 1952, p. 114-116.

Discusses the above with respect to influence on the Curie point of Fe_3C, and the thermomagnetic transformations of cobalt cementites. Includes charts.

5445* Several Observations on the Formation of Potentials of Aluminum in Common Salt Solutions. (In German.) Richard Ergang, Georg Masing, and Margaret Mohling. *Zeitschrift für Elektrochemie Berichte der Bunsengesellschaft für Physikalische Chemie*, v. 56, Jan. 1952, p. 8-16.

Reviews literature on the potentials of Al with different surface conditions in NaCl solutions. Concentration of Cl-ions was found to have no effect on the equilibrium potential. Data are graphed and tabulated. 16 ref.

5446* Density and Specific Volume of Liquid and Solid Gold-Silver Alloys. (In German.) Erich Gebhardt and Stefan Dorner. *Zeitschrift für Metallkunde*, v. 42, Dec. 1951, p. 353-358.

Describes experiments on the above using an indirect float method and an NaCl melt. Density and specific volume of pure Au, pure Ag, and the 10-90, 20-80, 40-60, 60-40, and 80-20 Au-Ag alloys, were determined between the liquidus temperature and 1300°C. Thermal-expansion coefficient, as well as density and specific volume of the same compositions, was determined between 20°C. and the solidus temperature. Shrinkage during solidification and while cooling in the solid state were determined. Data are tabulated and charted. 27 ref.

5447* Increase in the Rate of Viscous Flow of Metals in the Electrolyte During Electrochemical Polarization. (In German.) August Pfützenreuter and Georg Masing. *Zeitschrift für Metallkunde*, v. 42, Dec. 1951, p. 361-370.

Presents results of measurement of the above for Pb, Zn, Ag, Au, and Pt in the air and in an electrolyte. Possible explanation of the observed behavior is indicated. Data are tabulated and charted; apparatus is diagrammed. 11 ref.

5448* Values of Effective Ionic Radii of Elements in the Molten and Solid States at High Temperatures. (In Russian.) S. I. Sobol. *Zhurnal Prikladnoi Khimii*, v. 24, July 1951, p. 710-719.

The necessity of correcting values of atomic radii determined at room temperature for describing conditions at high temperatures is discussed. Data for various metals and alloys are tabulated and charted. 11 ref.

Miscellaneous Publications

5449 Electrical Resistance of Iron-Chromium-Carbon Alloys at High Temperatures. M. E. Blanter. Henry Brutcher, Translation 2738, 12 pages. (From *Zhurnal Tekhnicheskoi Fiziki*, v. 17, no. 5, 1947, p. 549-556.)

Previously abstracted from original.

Books

5450 Thermodynamics of Alloys. Carl Wagner. 161 pages. 1952. Addison-Wesley Press, Inc., Cambridge, Mass. (Translated and revised by Svante Mellgren and J. H. Westbrook from *Handbuch der Metallphysik*, v. 1, pt. 2, (Akademische Verlagsgesellschaft Becker and Erler Kom.-Ges., Leipzig, 1940.) (TN690 W12tr)

In addition to the discussion of new methods and the data abstracted from papers published between 1940 and 1951, the present book contains new sections on ternary and higher-order systems, empirical formulas, and relations between thermodynamic functions and the electronic constitution of alloys. Emphasis is on principles, but many data for specific systems are presented in order to illustrate the application of general relations. The reader may readily obtain complete information on a particular system with the aid of the alloy index and the bibliography, which comprises 419 entries. The thermodynamics of metallic phases involving such nonmetallic elements as hydrogen, carbon, nitrogen, sulfur, or phosphorus is also treated to some extent, especially to illustrate general relations.

See also:

5113 (magnetic properties of Bessemer steels)
5194 (properties of Cu-base alloys)
5201 (sintered Ti carbide)
5202 (hard metals—properties)
5343 (magnetic properties of Si ferrite)
5344 (thermal expansion of Si and Ge)
5346 (magnetic properties of Alnico-5)
5349 (electrical properties of Si-Fe transformer sheet)
5353 (electrical resistivity of boride phase of Ti)
5358 (solubility of C in Cr-Ni austenite)
5368 (magnetic properties of binary alloys)
5378 (magnetic analysis of Fe-C alloys)
5466 (physical properties of alloy steel)
5484 (titanium carbide compositions)
5486 (electrical conductivity of Be-Cu alloys)
5509 (electrical properties of Al and Cu wire)
5510 (Be-Cu wire)
5511 (density of molten Cu-Ag and Au-Cu alloys)
5634 (thermodynamics of vacuum-fusion analysis of metals)
5800 (temperature-resistivity characteristics of Mo)
5817 (metallic dental materials)

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6142 (density of Al, brass, and alloy-steel spheres)
6154 (cathodic hydrogen evolution from metallic cathodes)
6194 (adsorption phenomena on metals)
6195 (adsorption of monolayers on Pt)
6497 (ultrasonic attenuation in steel)
6498 (luminous output of Mg and Al pellets)
6514 (infrared properties of gold-smoke deposits)
6553 (ferromagnetic powders for ultrasonic generation)
6578 (electrical losses in steels)

13. METALS—MECHANICAL PROPERTIES AND TESTS

5451* Reinforcing Steel in Concrete and the Concept of Safety. K. Hajnal-Konyi. *Journal of the American Concrete Institute*, v. 23, Mar. 1952; *ACI Proceedings*, v. 48, 1952, p. 561-580.

Comparative tests on 36 beams reinforced with various types of large size bars, both in ordinary and high-grade concrete, prove the superiority of cold-worked steel over steel having a natural yield point, as regards safety factor and warning before failure. They also prove advantages of deformed bars over plain bars. Illustrations and tabular data.

5452 Some Aspects of the Charpy Test Applied to Steel Castings. J. E. Black. *American Foundryman*, v. 21, Mar. 1952, p. 56-58.

Serviceable steel castings may be rejected on the basis of charpy impact tests if the specimens are cut from poorly designed test castings. Experiments described show how ever-present micro-conditions can be minimized to make impact tests reflect hardenability response and inherent toughness of cast steel. The author's work illustrates how castings producers and Army Ordnance establishments cooperate in achieving maximum acceptance of usable castings.

5453 Hardness Measurements for Determination of Residual Stresses. George Sines and Ronald Carlson. *American Society for Testing Materials*, Feb. 1952, p. 35-37.

Presents experimental evidence of effect of stress on penetration-hardness measurements and suggests a method for measuring residual stresses by hardness measurements. A brief analysis of the effect of uniaxial stresses predicts the experimental results. Data for Armco iron, carbon steels, brass, Al, and Cu are presented.

5454* Statistical Investigation of the Tensile Strength of Cast Iron. (In German.) Gustav Meyersberg. *Archiv für das Eisenhüttenwesen*, v. 22, Nov.-Dec. 1951, p. 377-386.

Discusses considerations on the basis of the Weibull formula concerning the breakage probability. Various experiments verifying these considerations are described; data are tabulated and illustrated by schematic diagrams.

5455* Characterization of the Tendency Toward Brittleness of Steel in Notched-Bar Tensile and Tension-Impact Tests. (In German.) Wilhelm Kuntze. *Archiv für das Eisenhüttenwesen*, v. 22, Nov.-Dec. 1951, p. 387-393.

Discusses 3 main types of brittleness; natural, latent, and shape brittleness. Tests for determining the various types are indicated; results are discussed. Data are tabulated and charted.

5456* Notched-Bar Tensile Tests on Heat-Treated Structural Steel. (In German.) Alfred Krisch. *Archiv für das Eisenhüttenwesen*, v. 22, Nov.-Dec. 1951, p. 395-400.

Describes a series of tests on round notched and sharp notched bars at various temperatures. Results are indicated, data are tabulated and charted. 23 ref.

5457* Contribution to the Question of Fatigue Strength of Pieces of Various Sizes. (In German.) Max Hempel. *Archiv für das Eisenhüttenwesen*, v. 22, Nov.-Dec. 1951, p. 425-436.

Reviews the above on the basis of the literature and series of experiments. Results for a series of carbon and alloy steels are tabulated, charted, and discussed. 105 ref.

5458* Improving the Mechanical Properties of Low-Alloy Heat-Treatable Steels by Adjusting Temperatures and Times of Heat Treating. (In German.) Walter Eilender, Heinrich Arend, and Werner Neuhaus. *Archiv für das Eisenhüttenwesen*, v. 23, Jan.-Feb. 1952, p. 67-72.

Several steels were investigated in order to improve their tensile and notch-impact strengths. Tabulated results are confirmed by industrial experiments. Includes tables, graphs, and numerous references.

5459* Contribution to the Study of the Shape of Tensile Deformation Curves for Monocrystalline Specimens. (In French.) Bernard Jaoul and Charles Crussard. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Feb. 11, 1952, p. 700-702.

Discusses the factors which determine the shape of the above curves, and the position of various points on the curve. Illustrated by curves for monocrystalline Al of 3 degrees of purity.

5460* Effect of Cold Drawing on Creep-Resisting Molybdenum-Steel Steam Pipe. E. A. Jenkinson and D. C. Herbert. *Engineering*, v. 173, Mar. 14, 1952, p. 345-347. (A condensation.)

Cold drawing, during the intermediate stages of manufacture, has been used to improve the surface of carbon-steel pipes, and these pipes have been put into service after normalizing without apparent detriment to their high-temperature creep resistance. Since the corresponding effect on Mo steel was not known, tests were made on 2 steels (0.9% Cr + 0.4% Mo and 0.5% Mo + 0.2% V). Microstructures are illustrated; creep data are tabulated. From the results, it was concluded that cold-drawing of the two steels improves the surface finish, and does not result in any deterioration of the creep resistance of the steels, provided that the pipes were normalized after cold-drawing. Both steels showed no tendency to graphitize on prolonged heating after welding, either in the cold-drawn or hot-drawn condition.

5461 Effect of Basic Cupola Operation on Tensile Strength of Gray Iron. W. T. Bourke and T. J. Wood. *Foundry*, v. 80, Apr. 1952, p. 86-87, 217-218.

Presents a summary of the results obtained on a full-scale pilot operation. Graphs and illustrations.

5462* Determination of Elastic Constants and Stress/Strain Relationship to Fracture of Sintered Tungsten Carbide-Cobalt Alloys. E. Lardner and N. B. McGregor. *Journal of the Institute of Metals*, v. 80, Mar. 1952, p. 369-374.

Results of experiments show that, at room temperature, Young's modulus decreases considerably, and Poisson's ratio increases slightly, with rise in Co content. Determinations of Young's modulus between room temperature and 600°C. indicate a total decrease of the order of 5-6% at 600°C., the rate of decrease being almost uniform and independent of the amount of Co. There is evidence from the stress/strain relationship that when Co exceeds about 11%, some plastic deformation occurs at stresses well below the room-temperature fracture strength. Graphs and tables.

5463* Note on Sub-Crystal Structure in Cold-Rolled Aluminium. A. E. L. Tate and D. McLean. *Journal of the Institute of Metals*, v. 80, Mar. 1952, p. 390.

A sub-crystal structure has been detected microscopically in cold-rolled Al. The sub-crystals are about 20 times larger linearly than those detected by X-rays. Micrographs.

5464* Creep Relationships and Their Application to Pipes, Tubes, and Cylindrical Parts Under Internal Pressure. R. W. Bailey. *Institution of Mechanical Engineers, Proceedings*, v. 164, no. 4, 1951, p. 425-431.

Principal subjects embraced are: Creep-strain relations for simple and complex stress at any stage of creep – primary, secondary, or tertiary; stress distribution and creep of cylindrical parts under internal pressure, and related formulas for wall thickness; determination of design temperature to provide for specific temperature and pressure fluctuations; and action of creep in removing the thermal-expansion loading of a pipeline. Numerous graphs.

5465 The Hot-Torsion Test for Assessing Hot-Working Properties of Steels. D. E. R. Hughes. *Journal of the Iron and Steel Institute*, v. 170, Mar. 1952, p. 214-220.

A study was made of the hot-torsion test to assess its suit-

ability for determining the hot-workability of steels. The design and construction of a testing machine are described, and a suitable experimental technique was developed. Tests on mild-steel and high-carbon Cr-steel specimens over the ranges 950-1400°C. and 12-600 r.p.m., respectively, were made. Results are charted, tabulated, and discussed. Macrographs and micrographs show structures of broken test specimens. 12 ref.

5466 Discussion on the Paper—Physical and Mechanical Properties of Segregates in Two Alloy Steels, by H. M. Finniston and T. D. Fearnehough. *Journal of the Iron and Steel Institute*, v. 170, Mar. 1952, p. 221-225.

Paper published in Sept. 1951 issue.

5467* Resistance to Breaking and Cutting. (In Russian.) N. N. Davidenkov. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, May 1951, p. 751-768.

Author's reply to discussion by G. V. Uzhik (Nov. 1950 issue.) Various questions of strength and plasticity are discussed. 48 ref.

5468* Letter to the Editor. (In Russian.) N. P. Shchapov. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, May 1951, p. 769-770.

A discussion of the work of G. V. Uzhik in the field of strength and plasticity. (Nov. 1950 issue.) This discussion treats the question of stress concentration and the zone of plastic deformation around a fracture.

5469* The Phenomena of Plasticity During Brittle Fracture of Soft Steels. (In Russian.) S. O. Tsobkallo. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, June 1951, p. 844-847.

Describes experimental study which demonstrated a zone of plastic deformation in specimens broken at the temperature of liquid oxygen. Data are discussed and charted.

5470* Dependence Between Uzhik's Resistance to Fracture, Yield Strength, and True Resistance to Fracture. (In Russian.) V. I. Kudriavtsev. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, June 1951, p. 941-944.

A discussion of the work by G. V. Uzhik in the field of strength and plasticity. Experiments were made which indicate that Uzhik's resistance to breaking is actually resistance to plastic deformation. Data are discussed, tabulated, and charted.

5471* The Stress-Strain Diagram of Timepiece Springs. (In Japanese.) Tetsutaro Mitsuhashi, Ryuichi Nakagawa, and Sabura Saito. *Journal of Mechanical Laboratory*, v. 5, Oct. 1951, p. 247-251.

In order to determine permanent set of the above, an apparatus was developed to record its stress-strain curve. The specimen was high-carbon steel wire drawn to 0.5 mm. diam. Apparatus is diagrammed. Data are charted and tabulated.

5472* Studies of the Application of Materials. (In Japanese.) **VIII. Evaluation of Spring Steel.** Hisao Matsumoto and Kaoru Kamada. **IX. The Mechanism of Tensile Failure of Chain.** Hisao Matsumoto, Katsuyoshi Kimura, and Kaoru Kamada. *Journal of Mechanical Laboratory*, v. 5, Oct. 1951, p. 235-240; Nov. 1951, p. 279-284.

Results of experiments are tabulated, charted, and analyzed.

5473* Wear of Steel Against Soils. III. (In Japanese.) Tetsutaro Mitsuhasi, Yutaka Imai, and Shin Yokoi. *Journal of Mechanical Laboratory*, v. 5, Nov. 1951, p. 294-298.

Using the hand-drill-type of wear-testing machine, the above was studied for 3 carbon steels and a 1.56%-Cr steel. Results are charted, tabulated, charted, and discussed.

5474 Viscous Creep of Gold Wires Near the Melting Point. F. H. Buttner, E. R. Funk, and H. Udin. *Journal of Metals*, v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 401-407.

Gold wires, 5 mil. in diam., were found to creep viscously up to approximately 5.5×10^5 dynes per sq. cm. around 1300°K. Beyond this point, an additional slip mechanism appears. Observations made during the experiments agree with Herring's predictions. Graphs and tables. 21 ref.

5475 A Constant Stress Creep Test Apparatus. A. Latin. *Journal of Scientific Instruments*, v. 29, Mar. 1952, p. 98-99.

Briefly described and diagrammed.

5476* Belgian Research on Creep-Resistant Steels. (In French.) O. Bihet. *L'Ossature Métallique*, v. 17, Feb. 1952, p. 89-90.

Briefly outlines the above. Includes graphical results obtained for 4 alloy steels.

5477 Strength of Alloy Cast Irons. H. A. Altorfer. *Machine Design*, v. 24, Mar. 1952, p. 162-164. (A condensation.)

Presents an analysis of the limitations of cast steel and cast iron based on experimental results for cylindrical vessels.

5478 Inelastic Strains in Steel Beams. H. T. Corten, M. E. Clark, and O. M. Sidebottom. *Machine Design*, v. 24, Mar. 1952, p. 228, 230, 232. (A condensation.)

Reports experimental results on the above.

5479* The Influence of Impurities on the Properties of Metals. (In Dutch.) J. D. Fast. *Metalen*, v. 7, Jan. 15, 1952, p. 2-12; Jan. 31, 1952, p. 23-27; Feb. 15, 1952, p. 48-50.

In Part I, deleterious effects of inclusions on the mechanical properties of metals and alloys are discussed. In Part II (also in the Jan. 15 issue), favorable effects are considered. Very useful effects (mechanical hardening, magnetic hardening, and resistance to creep at high temperatures) can be obtained with inclusions formed by precipitation from supersaturated solid solutions. The same effects are deleterious if soft alloys (in the mechanical and magnetic sense) are desired. By studying the effects of carbon and nitrogen in pure Fe and in $FeMn_2$, a new explanation of magnetic aging of steel was obtained. In Part III, relationships between presence of inclusions and occurrence of dislocations are discussed. Several strain-aging phenomena can be explained on the basis of Cottrell's theory; but others do not seem to fit this theory very well. Includes diagrams. 36 ref.

5480* The Influence of Manganese, Silicon and Iron Contents Upon the Strength Properties of Aluminum-Zinc-Magnesium Alloys. (In German.) W. Mannchen. *Metall*, v. 6, Jan. 1952, p. 24-26.

The above was investigated on Al-Zn-Mg wires containing 4.5% Zn and 3.5% Mg. Data on tensile strength, elastic properties, and shearing strength are tabulated and charted. 14 ref.

5481* Effect of Surface Condition on Fatigue Bending Strength. (In German.) K. Wellinger and P. Gimmel. *Metalloberfläche*, ser. A, v. 6, Jan. 1952, p. A4-A9.

Results of experiments indicate that metallographic polishing reduces the fatigue bending strength of different steels, and of Armco iron. Relationship of applied stress and of tensile strength to fatigue strength is also discussed. Tables, graphs, and photomicrographs.

5482 Measurement and Calculation of Stresses in a Flywheel. (In Italian.) G. Oberti and G. Moravia. *Metallurgia Italiana*, v. 44, Feb. 1952, p. 78-82.

Describes the experimental technique followed in measuring, by means of electrical-resistance strain gages, the strains arising from centrifugal forces in a large flywheel. Simultaneously the authors carried out a theoretical calculation. Good agreement was achieved.

5483 How Can We Appraise Metals for High Temperature Services? Thomas J. Dolan. *Metal Progress*, v. 61, Mar. 1952, p. 55-60.

Summarizes principal observations on the factors influencing the fatigue strength of metals at high temperatures.

5484 Field of Cemented Carbides Expanded by Titanium Compositions. John C. Redmond and John W. Graham. *Metal Progress*, v. 61, Apr. 1952, p. 67-70.

Properties, fabrication, and application of Kentanium were investigated. Comparison is made with tungsten carbide and superalloys.

5485 Course of Impact Fracture. L. H. Satz. *Metal Progress*, v. 61, Mar. 1952, p. 79-80.

Describes impact tests made on welded stainless bars. The

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path of fracture was apparently influenced by the presence of tougher material in the immediate vicinity.

5486 Typical Properties of Beryllium-Copper Alloys. J. T. Richards. *Metal Progress*, v. 61, Mar. 1952, p. 80B.

A data sheet for the above.

5487 Properties of Molybdenum Made by Arc Casting and Powder Metallurgy. James H. Bechtold and Howard Scott. *Metal Progress*, v. 61, Apr. 1952, p. 82-88.

Discusses metal preparation, tensile properties, ductility, creep-rupture tests, and alloying for improvements.

5488 S-Curves for Chromium Stainless Steels. *Metal Progress*, v. 61, Apr. 1952, p. 96-B.

5489 Problems of Metallic Fatigue at High Temperature. Thomas J. Dolan. *Metal Progress*, v. 61, Apr. 1952, p. 97-104.

Discusses some specific alloys and special tests for severe services at high temperatures. In addition to high mechanical strength at elevated temperature, it is desirable that an alloy exhibit good ductility; resistance to erosion, oxidation, or chemical attack; high fatigue strength; and adequate stability. Data in tabular and graphical form.

5490* Influence of Structure on the Deformation of Metals. (In French.) J. Herenguel. *Métaux: Corrosion—Industries*, v. 27, Jan. 1952, p. 1-13.

Discusses factors affecting the above. Numerous macrographs and micrographs illustrate the concepts discussed, as applied to a variety of ferrous and nonferrous metals and alloys. Includes table showing the relationships of various fabrication processes to structural characteristics.

5491* The Prediction of Uranium Deformation Textures. E. A. Calnan and C. J. B. Clews. *Philosophical Magazine*, ser. 7, v. 43, Jan. 1952, p. 93-104.

Tension, compression and rolling textures were derived for the orthorhombic metal α-uranium. From a consideration of the relative importance of the slip and twinning mechanisms, it is possible to differentiate between the textures developed after slight and severe deformations at both room and elevated temperatures.

5492* A Calculation of the Elastic Shear Constants of β-Brass. H. Jones. *Philosophical Magazine*, ser. 7, v. 43, Jan. 1952, p. 105-112.

The stability of β-brass, with respect to shears across the (110) plane in the direction (110), is considered and is shown to be due mainly to the change of the Fermi energy as a result of shearing of the Brillouin zone. The constitution of the elastic shear constants, as the sum of 3 terms, is examined and a satisfactory account of the observed values is obtained. The difficulty experienced in attempting to retain the β-phases by quenching is briefly discussed.

5493* Quantitative Measurement of Preferred Orientation in Rolled Uranium Bars. G. B. Harris. *Philosophical Magazine*, ser. 7, v. 43, Jan. 1952, p. 113-123.

The preferred orientation of uranium bars hot-rolled and cold-rolled in the α range was determined quantitatively by X-ray diffraction using a Geiger counter. It is shown that hot rolling with a slight reduction causes the (010) planes to become strongly and the (110) planes weakly oriented perpendicular to the rolling direction. Further hot rolling causes the (110) planes to become strongly and the (130) planes weakly oriented in the planes perpendicular to the rolling direction.

5494* The Non-Hookean Interaction of a Dislocation With a Lattice Inhomogeneity. M. A. Jaswon and A. J. E. Foreman. *Philosophical Magazine*, ser. 7, v. 43, Feb. 1952, p. 201-220.

The equilibrium position of an edge dislocation near certain types of lattice irregularities was investigated quantitatively, using the Peierls model of a dislocation. The external shear stress required to maintain equilibrium was calculated and the result extended to an array of like dislocations piled up against a barrier. The integral equation for the atomic displacements is linearized by a perturbation technique, the resulting equation being solved exactly. 14 ref.

5495* Some Observations on Slip Lines in Iron. H. W. Paxton, M. A. Adams, and T. B. Massalski. *Philosophical Magazine*, ser. 7, v. 43, Feb. 1952, p. 257-258.

Points out that slip lines on the polished surface of body-centered-cubic Fe single crystals are dependent on previous mechanical straining.

5496* A Note on Estimating Yield-Point Loads in a Plastic-Rigid Body. R. Hill. *Philosophical Magazine*, ser. 7, v. 43, Mar. 1952, p. 353-355.

Limits are obtained for the error involved in use of an approximate theory of plasticity to estimate yield-point loads. Illustrates these by using the Mises yield function and potential to approximate the Taylor-Quinney data for Cu and Al.

5497* The Structure of Cast Iron Rolls. (In Polish.) J. Jastrzebska. *Prace Glownego Instytutu Metalurgii*, v. 3, no. 6, 1951, p. 463-489.

General working conditions for cast-iron calibrated-grain rolls as well as for chilled rolls intended for sheet rolling are described. The effects of microstructure and macrostructure of the rolls on mechanical properties are analyzed. Cast-iron rolls used in Poland in section-rolling mills are classified and optimum structures established on the basis of: tests and analysis of structures; wear statistics; and comparison of structures of Polish and foreign rolls. Some suggestions are advanced for improvement. Tables, graphs, and micrographs. 14 ref.

5498* Some Factors Affecting Creep of Carbon Steel. (In Polish.) Z. Borysowski and W. Tomaszczyk. *Prace Glownego Instytutu Metalurgii*, v. 3, no. 6, 1951, p. 507-515.

Effects of chemical composition and other metallurgical factors were studied. Results are charted, tabulated, and discussed. 21 ref.

5499 Effect of Strain Ageing Upon the Distribution of Glide Bands in Cadmium Crystals. D. F. Gibbons. *Proceedings of the Physical Society*, v. 65, sec. B, Mar. 1, 1952, p. 193-195.

Shows that there is a marked difference in the distributions of visible glide bands, after plastic deformation, between Cd crystals containing small amounts of N_2 and those relatively free from N_2. The distribution of glide bands in the crystals containing N_2 is compared with Lüders bands in strain-aged mild steel.

5500* Brass in the Production of Escapement Levers. (In French and German.) A. Simon-Vermot. *Pro-Metal*, v. 4, Dec. 1951, p. 923-925.

Describes mechanical and structural properties required of materials for the above watch parts. Testing methods for such alloys are indicated.

5501* On Cracks and Dislocations in Shafts Under Torsion. Alexander Weinstein. *Quarterly of Applied Mathematics*, v. 10, Apr. 1952, p. 77-80.

Presents mathematical analysis of the mechanism of development of the above. 10 ref.

5502* The Bauschinger Effect in Iron Single Crystals. N. H. Polakowski. *Research*, v. 5, Mar. 1952, p. 143-144.

With respect to the above, experiments on large iron single crystals were undertaken and the results are reported.

5503* New Contribution to the Study of the Influence of Microstructure on the Thermal Resistance of Steel. (In French.) Georges Delbart and Michel Ravery. *Revue de Métallurgie*, v. 49, Jan. 1952, p. 67-88.

Shows how the creep resistance of a Cr-Mo steel with a low C content varies as a function of microstructure, heat treatment, and load. Describes effects of preliminary annealing for 1000 hrs. at 450 and 575°C., and for 300 hrs. at 700°C. Tests were made on low-alloy Cr-Mo steels containing 0.31 and 0.53% C, with which it was possible to obtain more characteristic intermediate structures than with 0.12% C steel. Includes tables, micrographs, and charts.

5504* A New Method for the Micromechanical Testing of Metals. (In French.) N. Mironoff. *Revue de la Soudure; Lastijdschrift*, v. 7, no. 4, 1951, p. 214-232.

Describes alternating-bend tests for determining the ductility

of metals. Improvements on old methods are indicated; results are discussed. Schematic diagrams, graphs, and photomicrographs illustrate the article.

5505 ISTC Division VIII Review of Boron Steel Development. *SAE Journal*, v. 60, Mar. 1952, p. 26-34. (Excerpts from report by D. L. McBride.)

Discusses mechanical properties, composition, and weldability. Graphs and tabular data.

5506 Metallic Lubricants. N. C. Amen. *Steel*, v. 130, Mar. 24, 1952, p. 86.

Presents a study of MoS_2 and Cu-Pb alloys for their individual as well as collective contribution in maintaining bearing surface areas against wear. Petroleum products serve as a vehicle or binder for these materials.

5507* Biaxial Fatigue Tests on Flat-Plate Specimens. R. U. Blaser, J. T. Tucker, Jr., and L. F. Kooistra. *Welding Journal*, v. 31, Mar. 1952, p. 161s-168s.

Describes a method of materials testing simulating the state of stress encountered in pressure-vessel service. This method was developed to obtain data on plate materials under cyclic biaxial stress conditions at minimum cost. An experimental stress analysis is given for a ¾-in.-thick specimen. Methods of detecting initiation of rupture are discussed as well as final appearance of the fatigue fracture. Graphs and photomicrographs.

5508* The Torsion Test for Wire. J. G. Walford. *Wire Industry*, v. 19, Mar. 1952, p. 233-235, 280.

Effect of specimen length and tensile stress on the number of twists to fracture was determined.

5509 Effect of Heating at 200 and 500°F. on the Properties of Aluminum and Copper Wires. Allen S. Russell. *Wire and Wire Products*, v. 27, Mar. 1952, p. 255-256.

Reports on a limited investigation of the effect of heating in air at 300 and 500°F. on electrical and tensile properties of annealed Cu and hard-drawn Al wires. Tabular data.

5510 Beryllium Copper Wire: Property and Design Considerations. John T. Richards. *Wire and Wire Products*, v. 27, Mar. 1952, p. 257-262, 303-307.

Covers available data on the physical, mechanical, and corrosion-resistant properties of above alloy. Certain design features are considered, since a modified design may prove more advantageous than making a direct substitution of another material for Be-Cu. Tabular data. 20 ref.

5511* Internal Friction of Liquid Copper-Silver and Gold-Copper Alloys. (In German.) Erich Gebhardt and Georg Wörwag. *Zeitschrift für Metallkunde*, v. 42, Dec. 1951, p. 358-361.

Describes experiments on the above, using an apparatus previously described, and covering a range of temperature. Includes values for density. Data are tabulated and charted.

5512* The Rolling and Recrystallization Textures of Pure Aluminum. (In German.) Hans Joachim Wallbaum. *Zeitschrift für Metallkunde*, v. 42, Dec. 1951, p. 371-376.

Describes X-ray investigations of the above structures. Investigations show that both types depend on degree of rolling. Types of structures obtained at various rolling temperatures are described, and illustrated schematically. 99.5% Al sheet was studied.

5513* Effect of Lead on Modulus of Elasticity and Damping Properties of Copper, Silver, Ordinary Brass, and Red Brass. (In German.) Werner Köster and Lothar Bangert. *Zeitschrift für Metallkunde*, v. 42, Dec. 1951, p. 391-394.

Data on the above, for various compositions, are charted, tabulated, and discussed.

5514* Application of the Block Model of Electronic Theory to the Crystal Chemistry of Alloys. IV. Distortion of Simple Structures. (In German.) Konrad Schubert. *Zeitschrift für Metallkunde*, v. 43, Jan. 1952, p. 1-10.

Describes the distorted systems frequently occurring in metallic structures on the basis of the literature. Possible explanations are indicated; and effects of various factors are discussed. Application to a wide variety of specific alloy systems is discussed. Data are charted. 46 ref.

Miscellaneous Publications

5515 Apparatus For Recording the Compressive Stress-Strain Curve For Thin Material Coupons at Large Strains. B. Bergqvist. Aeronautical Research Institute of Sweden, Report 39, 1951. 30 pages. (TL526 A82r)

Describes, diagrams, and illustrates above apparatus, which consists mainly of a jig supporting the specimen against excess buckling. Some typical tests results are presented.

5516 The Theory of Plastic Flow in Single Crystals. Frederick Seitz. "A Symposium on the Plastic Deformation of Crystalline Solids." Office of Technical Services, U. S. Department of Commerce, 1950, p. 1-36. (QC191 M48s)

Presents an extensive review on the above. 54 ref.

5517 Multiplication Processes for Slow-Moving Dislocations. F. C. Frank and W. T. Read, Jr. "A Symposium on the Plastic Deformation of Crystalline Solids," Office of Technical Services, U. S. Department of Commerce, 1950, p. 44-46; disc., p. 46-48. (QC191 M48s)

Describes how the above can take place.

5518 Creep of Zinc Crystals. E. P. T. Tyndall. "A Symposium on the Plastic Deformation of Crystalline Solids," Office of Technical Services, U. S. Department of Commerce, 1950, p. 49-58; disc., p. 58-59. (QC191 M48s)

A very simple, empirical law of creep is proposed for Zn crystals with a secondary orientation equal to or nearly equal to zero. No indication is found of any sudden onset of slip or of a critical shear stress for its occurrence. Diagrams and graphs. 12 ref.

5519 The Yield Point in Single Crystal and Polycrystalline Metals. A. H. Cottrell. "A Symposium on the Plastic Deformation of Crystalline Solids". Office of Technical Services, U. S. Department of Commerce, 1950, p. 60-73; disc., p. 73-76. (QC191 M48s)

Discusses characteristics of the yield phenomenon. 33 ref.

5520 The Lamellar Nature of Slip and Its Implications. T. H. Blewitt and J. S. Koehler. "A Symposium on the Plastic Deformation of Crystaline Solids," Office of Technical Services, U. S. Department of Commerce, 1950, p. 77-86; disc., p. 86-88. (QC191 M48s)

Considers some experiments on Al, $AuCu_3$, and α-brass single crystals. Discusses the various stages of deformation. 15 ref.

5521 The Origin of Dislocations. F. G. Frank. "A Symposium on the Plastic Deformation of Crystalline Solids." Office of Technical Services, U. S. Department of Commerce, 1950, p. 89-99; disc., p. 100-102. (QC191 M48s)

Presents an outline of the deformation process. Formation of dislocations under stress, the dynamic multiplication of dislocations, and the origin of initial dislocations are considered. 15 ref.

5522 The Experimental and Theoretical Results of Plasticity at Normal Speeds of Strain. U. Dehlinger. "A Symposium on the Plastic Deformation of Crystalline Solids." Office of Technical Services, U. S. Department of Commerce, 1950, p. 103-110; disc., p. 110-112. (QC191 M48s)

Briefly reviews the work done on the above in the last 20 years at Stuttgart Univ., Germany. Presents some semi-empirical formulas describing the data obtained in Stuttgart and elsewhere. 14 ref.

5523 X-Ray Diffraction Studies of Cold Work in Metals. B. E. Warren and B. L. Averbach. "A Symposium on the Plastic Deformation of Crystalline Solids." Office of Technical Services, U. S. Department of Commerce, 1950, p. 113-121; disc., p. 122-123. (QC191 M48s)

Results of measurements on filings of α-brass are reported. Data are graphed.

5524 Dislocation Models of Crystal Grain Boundaries. W. T. Read and W. Shockley. "A Symposium on the Plastic Deformation of Crystalline Solids." Office of Technical Services,

13. *Metals—Mechanical Properties and Tests*

U. S. Department of Commerce, 1950, p. 124-149. (QC191 M48s)

Deals in detail with grain-boundary models for certain specially simple cases, pointing out how the results may be extended so as to apply more generally.

5525 The Resultant Content of Dislocations in an Arbitrary Intercrystalline Boundary. F. C. Frank. "A Symposium on the Plastic Deformation of Crystalline Solids." Office of Technical Services, U. S. Department of Commerce, 1950, p. 150-151; disc., p. 151-154. (QC191 M48s)

Derives the above, showing that the dependence of the dislocation density in the grain boundary depends upon the geometry of the situation.

5526 A Study of Amplitude-Dependent Internal Friction Arising From the Motion of Dislocations in Single Crystals of Copper. A. S. Nowick. "A Symposium on the Plastic Deformation of Crystalline Solids." Office of Technical Services, U. S. Department of Commerce, 1950, p. 155-167; disc., p. 167-170. (QC191 M48s)

Presents a quantitative study of the above as a function of frequency and temperature. Shows that such measurements lead to information about the nature of the motion of dislocations at low stress levels. Data are graphed. 11 ref.

5527 Decrement and Young's Modulus Measurements on Single Crystals of Copper and Lead. J. Marx and J. S. Koehler. "A Symposium on the Plastic Deformation of Crystalline Solids." Office of Technical Services, U. S. Department of Commerce, 1950, p. 171-183; disc., p. 183-184. (QC191 M48s)

Attempts to discover the physical causes for the various effects resulting from the above investigation. Data are graphed. 10 ref.

5528 Structure of Cold-Worked Metals as Deduced From Anelastic Measurements. T. S. Ke and C. Zener. "A Symposium on the Plastic Deformation of Crystalline Solids." Office of Technical Services, U. S. Department of Commerce, 1950, p. 185-191; disc., p. 191-192. (QC191 M48s)

Presents results of an investigation on the above. Data are graphed for cold-worked Al.

5529 The Plasticity of Polycrystalline Solids. Bruce Chalmers. "A Symposium on the Plastic Deformation of Crystalline Solids." Office of Technical Services, U. S. Department of Commerce, 1950, p. 193-196; disc., p. 196-198. (QC191 M48s)

It has been believed by many investigators that the best approach to the understanding of plasticity was to study first the behavior of single crystals, and then to use this information to elucidate the more complex case of a polycrystalline aggregate. Discusses the progress that has been made from this point of view and draws attention to the difficulties that arise when an attempt is made to interpret polycrystalline plasticity in terms of single-crystal data.

5530 Wanted: Experimental Support for Theories of Plastic Flow. J. C. Fisher and J. H. Hollomon. "A Symposium on the Plastic Deformation of Crystalline Solids." Office of Technical Services, U. S. Department of Commerce, 1950, p. 199-208; disc., p. 209-210. (QC191 M48s)

Surveys various theories of the time-dependent deformation of metals. Presents creep curves for several metals.

5531 A Theory of Deformation Textures in Face-Centered Cubic Metals. Walter R. Hibbard, Jr. "A Symposium on the Plastic Deformation of Crystalline Solids." Office of Technical Services, U. S. Department of Commerce, 1950, p. 211-215. (QC191 M48s)

Discusses the above. Numerous diagrams. 15 ref.

5532 The Crystallographic Aspect of Slip in Body-Centered Cubic Single Crystals. A. Opinsky and R. Smoluchowski. "A Symposium on the Plastic Deformation of Crystalline Solids." Office of Technical Services, U. S. Department of Commerce, 1950, p. 216-223. (QC191 M48s)

Reports the results of a general analysis of the slip behavior of b.c.c. lattices and also results of some preliminary experiments on Fe-Si alloys. Numerous graphs.

Books

5533 Buckling Strength of Metal Structures. Friedrich Bleich. 508 pages. 1952. McGraw-Hill, New York. (TA460 B61b)

Presents data on the behavior of fabricated steel structures under compression loading, especially applicable in structural and ship design. Covers a wide range of subjects from the buckling of centrally or eccentrically loaded columns to stability of web plates of girders and special problems in the design of ship plating. Numerous formulas, tables, and graphs.

5534 Studies in Large Plastic Flow and Fracture With Special Emphasis on the Effects of Hydrostatic Pressure. P. W. Bridgman. 362 pages. 1952. McGraw-Hill, New York. (TA405 B76s)

Presents a reference work for advanced students and fundamental researchers on fracture and plastic flow. Collects into a coordinated whole the results of original experiments by the author.

5535 The Hardness of Metals. D. Tabor. 175 pages. 1951. Clarendon Press, Oxford. (TA460 T11h)

Attempts to explain hardness measurements in terms of some of the more basic physical properties of metals. Starting with the assumption that metals possess certain elastic and plastic characteristics, it shows that the hardness behavior of metals may be expressed in terms of these characteristics.

5536 A Symposium on the Plastic Deformation of Crystalline Solids. 223 pages. 1950. Office of Technical Services, U. S. Department of Commerce, Washington. (QC191 M48s)

Covers meeting held at Mellon Institute, Pittsburgh, May 19-20, 1950, under joint sponsorship of Carnegie Institute of Technology and Office of Naval Research. Individual papers are separately abstracted.

See also:

5098 (tensile and impact properties of iron and alloys)
5106 (effect of alloying elements on pure Fe)
5109a (refining effects of Al-Si alloys)
5113 (impact and bend strength of Bessemer steels)
5135 (mechanical properties of Ni-base casting alloys)
5154 (mechanically cast pig iron)
5159 (nodular cast iron)
5163 (fatigue and failure of drill steel)
5169 (low-alloy steel plates)
5172 (mechanical properties of extruded steel)
5194 (properties of Cu-base alloys)
5196 (effects of machining on residual stress—book)
5201 (sintered Ti carbide)
5202 (hard metals—properties)
5214 (arc-welded steel tubes)
5226 (mechanical tests on steel chain and slings)
5227 (fatigue of welded structures)
5247 (austenitic-ferritic welds)
5248 (deformation of weldments)
5251 (mechanical properties of Ti and alloys)
5257 (mechanical properties of welded steel tubing)
5258 (alloy cast irons—heat-treatment effects)
5265 (testo on rocket-motor bodies)
5267 (hardness of carburized cases)
5318 (strain-gage stress determination in electrodeposits)
5319 (stresses in hard facing on rails)
5324 (properties of sprayed-metal coatings)
5336 (slip patterns in α-uranium)
5343 (grain bending in plastic deformation)
5352 (plasticity of Fe-Ni-Ta alloys)
5389 (mechanical properties of Al-Cu and Al-Zn alloys)
5443 (mechanical properties of Cu alloys)
5547 (stress distribution in rails)
5573 (turbine-blade erosion)
5578 (failure of stainless compressor blades)
5584 (stressing hollow axles for increased fatigue resistance)
5799 (mechanical properties in stratospheric flight)
5815 (properties of die steels)
5915 (stress in vehicle structures, torsional fatigue)
5949 (properties of Be_2C)
6015 (design for increased fatigue strength)
6018 (aircraft structural research)
6032 ("Strength of Materials" text)
6557 (microscopic study of "fretting")

14. CORROSION

5537 The Reaction of Cerium With Oxygen. Daniel Cubicciotti. *Journal of the American Chemical Society*, v. 74, Mar. 5, 1952, p. 1200-1201.

Oxidation of Ce was found to obey the parabolic law from 30 to 125°C. Above 125°C., the reaction started parabolically, but subsequently became linear. The parabolic portion became shorter as the temperature was increased. Ce is the most rapidly oxidizing metal yet studied. Energy of activation of the parabolic reaction is the smallest yet observed.

5538* Is Cathodic Protection Justified on Lines With Superior Coating? Marshall E. Parker. *American Gas Journal*, v. 176, Mar. 1952, p. 14-15, 42.

Refers to underground pipelines. Corrosion engineers answer above question in the affirmative, even if the soil traversed is only mildly corrosive.

5539* Corrosion History of a Domestic Hot Water System. John R. Baylis. *Journal, American Water Works Association*, v. 44, Mar. 1952, p. 224-238.

Describes and analyzes the condition of a hot-water tank after 22½ yrs. of use. The tank was galvanized iron, 30-gal. capacity, with metal thickness of 0.08 in. It was connected to a furnace heater and to a gas heater.

5540* Staining of Copper Alloys After Pickling in Sulphuric Acid. A. L. Simmons. *Australian Journal of Applied Science*, v. 2, Dec. 1951, p. 464-472.

Describes an investigation carried out with Cu-Zn alloys and Ni silvers. Shows that acid carried over into the rinse water after pickling is a major cause of staining during subsequent storage.

5541 Preventing Intergranular Corrosion Due to Welding Stainless. Stanley C. Orr. *Chemical Engineering*, p. 286, 288, 290, 292-294, 296.

Discusses the merits of 3 principal ways and gives reasons why heat treatment is often better than the use of stabilized and extra-low-carbon stainless steels. Diversion of Cb – formerly available as a stabilizing agent—to high-strength and heat-resistant alloys is only one factor favoring the heat-treatment method.

5542 Lubricant Corrosion is Being Licked. *Chemical and Engineering News*, v. 30, Mar. 17, 1952, p. 1098.

Tells how MoS_2 can be used to prevent fretting corrosion of closely fitted machine parts. Design factors are considered as a means of eliminating crevice corrosion in engines.

5543 The Use of Radioactive Tracers in the Study of the Mechanism of Action of Corrosion Inhibitors. D. M. Brasher and E. R. Stove. *Chemistry & Industry*, Feb. 23, 1952, p. 171-172.

Reports work on the above directed primarily towards the elucidation of the mechanism of the inhibitive action of sodium benzoate; but, in view of the excessive cost of sodium benzoate containing C^{14}, it was decided to develop the necessary microtechnique by preliminary work with radioactive K_2CrO_4.

5544 Performance of Magnesium Galvanic Anodes in Underground Service. Oliver Osborn and H. A. Robinson. *Corrosion* (Technical Section), v. 8, Apr. 1952, p. 114-129; disc., p. 129.

Above is reviewed in the light of past 5 yrs. of field testing in which 2500 anodes have been tested in some 40 different backfills and in various soils. Pertinent indices of galvanic-anode performance are cited and various factors influencing the performance of Mg anodes enumerated. A summary of the most outstanding findings is presented.

5545 Radiant Heating Systems Need Cathodic Protection Too. J. F. Hirshfeld and L. P. Schaefer. *Corrosion* (Technical Section), v. 8, Apr. 1952, p. 140-142.

Describes cathodic-protection systems installed in two bus garages of the Detroit City Dept. of Street Railways to avoid replacement of a radiant-heating system. The protection system consisted of graphite anode rods installed under the concrete floor connected to Se rectifiers of appropriate capacity. Pipes are steel or wrought iron.

5546 Physical Chemical Aspects of Corrosion Inhibition. Norman Hackerman. *Corrosion* (Technical Section), v. 8, Apr. 1952, p. 143-148; disc., p. 148-149.

Some of the basic physical and chemical phenomena which occur during inhibition of corrosion of metals by liquid environments are discussed. The way in which each of these may be involved and their relative importance in the overall process is considered. Several recent researches in this field are examined. 26 ref.

5547 Corrosion Problems of the Railroads. L. S. Crane. *Corrosion* (Technical Section), v. 8, Apr. 1952, p. 149-151. (Reprinted from *Railroad Corrosion News Letter*, v. 1, Jan. 1952).

Major corrosion problems of railroads and remedies are listed, including bridge painting, brine-drippings damage, car painting, steam-boiler corrosion cracking, Diesel-engine corrosion difficulties with cylinder liners, bearing and injection systems, trackage losses from stress, humidity, and mechanical deficiencies. Work of the American Railway Engineering Association in redesign of rail-fillet area to give better stress distribution is mentioned.

5548 The Electrical Nature of Corrosion and Cathodic Protection. H. D. Holler. *Electrical Engineering*, v. 71, Apr. 1952, p. 367-373.

This study of corrosion from the electrical standpoint is an evaluation of the behavior of galvanic couples in accordance with the laws of electricity. 16 ref.

5549 Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry*, v. 44, Mar. 1952, p. 89A-90A, 92A.

Discusses corrosion of stainless steels by H_2SO_4 as a function of temperature. A note on iron-blast-furnace slag is also included.

5550 Alternate Immersion Corrosion Test Equipment; Improvements in Design. Chuk-Ching Ma. *Industrial and Engineering Chemistry*, v. 44, Mar. 1952, p. 583-585.

Describes the above. Characteristic features are the hanging of the specimen in a horizontal position to ensure equal duration of immersion of all parts of the specimen, and the continuous up-and-down movement of the specimen.

5551* Protection of Metallic Structures From Corrosion in Soil by the Use of Protectors. (In Russian.) A. F. Lunev and G. V. Akimov. *Izvestiia Akademii Nauk SSSR*, Section of Chemical Sciences, July-Aug. 1951, p. 361-369.

Experiments were made to evaluate the cathodic protection action of Mg, a Mg-Zn-Al alloy, an Al-Zn alloy, and Zn on iron structures exposed to underground corrosion. Cylindrical castings of Mg or the Mg-alloy were found to be superior. Filling the castings with $CaSO_4$, $CaSO_4+MgSO_4$, and similar compounds added to the protective action. Results are discussed, tabulated, and charted.

5552* Corrosion Resistance of the Weld Zone in Stainless Steels. (In Japanese.) Tetsutaro Mitsuhashi, Yutaka Imai, Manabu Ueno, and Toshiaki Hagiwara. *Journal of Mechanical Laboratory*, v. 5, Oct. 1951, p. 262-268.

Presents comprehensive description of the above as encountered in the Japanese textile industry. Data are tabulated and charted for various chemical solutions and stainless-steel compositions. Results are summarized in English.

5553 Experts Voice Opinions in Agreement and Rebuttal on "A Critical Look at Salt Spray Tests." *Materials & Methods*, v. 35, Mar. 1952, p. 77-81, 156, 158, 160, 162, 164, 166, 168.

Comments on Frank LaQue's article (in last month's issue) differ widely, but most users and specifiers agree that there is room for improvement in the tests and their application.

5554* The Corrosion of Cadmium and Zinc Coatings. (In German.) G. Schikorr. *Metalloberfläche*, ser. A, v. 5, sec. 1951, p. A177-A185.

Describes compartive quantitative experiments on the above. Results are discussed, tabulated, and charted. 22 ref.

5555* Short-Time Testing of Electrolytic Chromium-Nickel Coatings for Corrosion Resistance. (In German.)

14. *Corrosion*

Hermann Hefele. *Metalloberfläche*, ser. B, v. 4, Feb. 1952, B17-B24.

Compares atmospheric corrosion with results of various accelerated corrosion tests. Describes porosity tests, and discusses causes of corrosion-increasing pores, blisters, and cracks in Cr-Ni electrodeposits. Photomicrographs, tables, diagrams, and graphs are presented. 21 ref.

5556 Liquid Sodium—A Noncorrosive Coolant. R. F. Koenig and S. R. Vanderberg. *Metal Progress*, v. 61, Mar. 1952, p. 71-75.

Presents recent data on the corrosive properties of liquid Na in contact with stainless steels and high-Ni alloys; and describes several test methods. The most fundamental approach employs solubility studies. Small containers of the material being tested are filled with Na, and samples of the Na are removed after suitable periods of heating. Chemical analysis of the samples provides solubility data. From this and metallographic examination of the containers, an indication of rate, extent, and manner of attack was obtained. Describes other methods, including those revealing effect on mechanical properties.

5557 Trends in Corrosion Control. Herbert H. Uhlig. *Metal Progress*, v. 61, Mar. 1952, p. 82-88.

Reviews the above, since 1900. Deals with superstition and science; evaluating corrosion rate of metals and alloys; paints; metallic and nonmetallic coatings, cathodic protection, and role of the corrosion engineer.

5558 High Temperature Scale Resistance. Albert M. Portevin. *Metal Progress*, v. 61, Apr. 1952, p. 94-95.

Briefly reviews general principles applied in getting good chemical resistance at high temperatures in metals and alloys. Deals with refractories used in metallurgical processes to increase oxidation resistance.

5559* Solution of Iron by Dilute Sulfuric Acid in a Magnetic Field. F. Blaha. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 83, Feb. 15, 1952, p. 248-250.

Tabulated data confirm Ehrenhaft's discovery that a magnetic field increases the evolution of oxygen due to solution of Fe in dilute H_2SO_4.

5560* Corrosion. *Oil and Gas Journal*, v. 50, Mar. 17, 1952, p. 203-210, 212-213, 216, 220, 224.

Presents questions and answers on corrosion types—causes and prevention, cathodic protection, materials used to fight corrosion, applications—equipment, environment, and testing. 28 ref.

5561* Engineering Inspection for Corrosion Control. F. A. Upson. *Oil and Gas Journal*, v. 50, Mar. 17, 1952, p. 227-228, 231-232.

Describes a program for the above which maintains a constant and accurate check on equipment service. An orderly system of records in turn provides valuable information for the prevention of accidents, development of corrective measures, and design of future operating units.

5562* How to Combat Corrosion in Processing Oil and Gas. Marshall E. Parker. *Oil and Gas Journal*, v. 50, Mar. 17, 1952, p. 235-244.

Briefly discusses each of the basic and special types of corrosion and presents a sketched illustration. Also includes detailed information on the following: losses caused by corrosion; weapons against corrosion; corrodents in the refinery; detection and diagnosis of corrosion; designing against corrosion; corrosion-testing methods; and controlling unanticipated corrosion.

5563* Low-Temperature Corrosion in a Crude-Distillation Tower. T. N. Griswold. *Oil and Gas Journal*, v. 50, Mar. 17, 1952, p. 247-248, 250, 255.

Discusses causes for the above, tests with steel, Monel, and cast iron; and control by desalting and NH_3 injection.

5564* Applications of Cathodic Protection to Control Refinery Corrosion. V. W. Hatchett. *Oil and Gas Journal*, v. 50, Mar. 17, 1952, p. 256, 258-259, 261-262, 264.

Describes and discusses the sacrificial-anode procedure and induced-current method, giving case histories for each. Includes economics of cathodic protection.

5565* Cities Service Tackles Brackish-Cooling-Water Corrosion. J. J. Picarazzi. *Oil and Gas Journal*, v. 50, Mar. 17, 1952, p. 271-272, 274, 276, 279-280, 282.

Discusses the above problem and methods used for combatting it—screening, analysis, and intermittent chlorination of water; use of special tube material, and coatings. Materials included Al-brass ferrules in Admiralty metal tubing; 70-30 Cu-Ni tube sections; and Alclad tubes. Internal appearance of used tubes is illustrated.

5566* How Gulf Oil Corp. Reduces Furnace Tube-End Corrosion. F. C. Braun. *Oil and Gas Journal*, v. 50, Mar. 17, 1952, p. 285-286, 288-289.

Excessive deterioration in the rolled ends of carbon or low-alloy steel tubes is related to stresses set up during expansion, distortion of metal structure, and erosion caused by turbulence at the internal offset formed by the expander during the rolling operation. Other remedial methods evaluated are safe ending, high-alloy end liners, and inside-upset tube ends.

5567* How to Control Internal Corrosion of Crude Still Condensers. Marion J. Wilcox and Franklin M. Watkins. *Oil and Gas Journal*, v. 50, Mar. 17, 1952, p. 290-293.

Discusses use of organic inhibitors for control of the above, used in petroleum refining.

5568* Salt-Water Corrosion in Refinery Cooling Equipment. Byron M. Beildeck and O. F. Noss, Jr. *Oil and Gas Journal*, v. 50, Mar. 17, 1952, p. 296, 299-300, 302, 304.

Presents results of an investigation to determine magnitude and causes of the increase in corrosion and to study the salt-water system in as many phases as necessary to determine what changes should be made to improve the situation.

5569* Magnolia Reduces Furnace Corrosion in Polyformer. J. J. Baker. *Oil and Gas Journal*, v. 50, Mar. 17, 1952, p. 306, 309, 316.

Discusses the above, attained through installation of higher alloy steel. Graphs and tables show results obtained.

5570* Production-Proved Inhibitor Gets Results in Refineries and Natural-Gasoline Plants. Forrest E. Love. *Oil and Gas Journal*, v. 50, Mar. 17, 1952, p. 310-312.

Discusses an organic corrosion inhibitor used in refineries to afford protection in practically every kind of refining process and against most types of corrosion encountered by refiners. A possible exception is high-temperature, furnace-tube corrosion. A brief summary of the different installations where the material, Kontrol, manufactured by Tretolite Co., is in service, is given.

5571* Case Histories of Corrosion Problems and Use of Protective Coatings in Their Solution. I. Interior Tank Corrosion. W. B. Cook. *Oil and Gas Journal*, v. 50, Mar. 17, 1952, p. 313-316.

Describes various instances encountered at Gulf Oil Corp.'s Port Arthur refinery.

5572* Corrosion in Monoethanolamine Solutions. Marshall E. Parker. *Oil and Gas Journal*, v. 50, Mar. 31, 1952, p. 122.

Development of the amine process for removal of acid gases from natural and refinery gas, together with the later combination amine-glycol process for simultaneous removal of water, brought in its wake a set of corrosion problems. Modification of process conditions, and the use of Al 3S alloy, Al 3S Alclad, and 4-6 Cr, ½ Mo steel have proved to be satisfactory for preserving tubes in this service.

5573* Avoid Blade Corrosion and Erosion. W. H. Lloyd. *Power*, v. 96, Apr. 1952, p. 94-97, 206.

Devoted to inspection, correction, and restoration aspects of the above for steam turbines. Material mainly used is 12%-Cr steel. Photographs.

5574* Study on the Anodic Passivation of Lead, Part I. Effect of Cl^- and Co^{++} Ions on the Passivation of Lead in Zinc Sulfate Solution. (In Polish.) M. Smialowski and E. Przybyla. *Prace Glownego Instytutu Metalurgii*, v. 3, no. 6, 1951, p. 501-505.

The change of lead anode potential with time was studied experimentally at various current densities, using a Curie electrometer and a photographic recorder. Typical potential-time curves obtained under "normal" experimental conditions are presented. Results obtained with pure Pb anodes and with Pb anodes containing 1% Ag are compared.

5575* Black Spots on Brass. (In French and German.) Paul Ducommun. *Pro-Metal*, v. 4, Dec. 1951, p. 925-927.

Proposes an explanation of above phenomenon. Because of differential aeration, corrosion results from the formation of small galvanic concentration cells in wet spots between brass plates. Describes experiments verifying the theoretical explanation.

5576* Prevention of Corrosion of Ships in Sea Water by Means of Cathodic Protection. K. N. Barnard. *Research*, v. 5, Mar. 1952, p. 116-125.

Describes the general experience of the Naval Research Establishment, Halifax, Nova Scotia, with cathodic protection as a means of preventing the corrosion of shipping in sea water, and discusses some of the economical aspects of the use of such a system. Deals with the use of Mg anodes as a means of protection. (To be continued.)

5577* Corrosion Inhibitors and Promoters in Liquid Media. (In French.) L. Cavallaro and A. Indelli. *Revue de Métallurgie*, v. 49, Feb. 1952, p. 117-124.

Presents results of studies of the action of chromates and nitrates on carbon steel in a neutral medium and on stainless steel in an acid medium; corrosion of a carbon steel–stainless steel couple; effect of sulfurous anhydride; and rate of corrosion. Includes tables and graphs. 26 ref.

5578 Hydrogen Causes Embrittlement of Forged Compressor Blades. A. E. Durkin. *Steel*, v. 130, Mar. 24, 1952, p. 76,78.

Analyzes failure of stainless-steel blades and discusses prevention. Electrolytic surface corrosion builds up H_2 pressure, resulting in eventual cracking. Painting decreases susceptibility to embrittlement.

5579* Sweet Oil Well Corrosion. H. L. Bilhartz. *World Oil*, v. 134, Apr. 1952, p. 208, 210, 213-214, 216.

Above problem at high and low pressure are briefly discussed from the standpoints of investigative approach, criteria, causative agents, and remedial measures. Preliminary findings of representatives of 30 companies are given. Includes use of plastic-coated tubing, nickel tubing, and galvanized or Ni-plated pipe. Diagrams and photographs.

5580* The Influence of Ammonium Salts on the Corrosion of Powdered Copper. (In Russian.) A. V. Pomosov, T. N. Rogatkina, and A. I. Levin. *Zhurnal Prikladnoi Khimii*, v. 24, July 1951, p. 720-722.

The above was studied experimentally. It was shown that the volatility of the acid forming the anion of the salt is the basic factor determining the corrosion activity of the salt. Data are discussed and tabulated.

5581* The Problem of Atmospheric Corrosion of Copper Powder. (In Russian.) A. V. Pomosov and A. I. Levin. *Zhurnal Prikladnoi Khimii*, v. 24, July 1951, p. 723-726.

The corrosion of Cu powder by dry and moist vapors (H_2S, SO_2, CO_2, HCl and NH_3) was investigated. Data are discussed and tabulated.

Miscellaneous Publications

5582 Interim Report of the Departmental Committee on the Deterioration of Cast Iron and Spun Iron Pipes. British Ministry of Health, 1950, 48 pages. (TS280 G79d) 3s., 6d.

The above is mainly concerned with external deterioration and considers internal conditions only where they have a direct bearing on external corrosion. Micrographs. 26 ref.

5583 Crystallochemical Mechanism of Formation of Oxide Film on Iron at Room Temperature. P. D. Dankov and N. A. Shishakov. Henry Brutcher, Translation 2740, 11 pages. (From *Zhurnal Fizicheskoi Khimii*, v. 23, no. 9, 1949, p. 1031-1035.)

Describes an experimental study of the several stages of oxide formation in an electron-diffraction vacuum apparatus to obtain information on mechanisms of the oxidation process. Gives data on the different oxides obtained and an explanation of the transitions from one oxide to another. Electron micrographs.

5584 Corrosion Fatigue Resistance of Hollow Axles Increased by Pre-Imposed Compressive Stresses. H. Bühler. Henry Brutcher, Translation 2818, 3 pages. (Condensed from *Werkstatt und Betrieb*, v. 84, 1951, p. 464-466.)

A study was made on hollow axles of railroad cars to find out whether or not pre-imposition of stresses of a magnitude desirable from the viewpoint of increased fatigue resistance is also feasible in industrial practice without appreciable changes in conventional heat treatment.

See also:

5132 (corrosion of pipes due to sulfur)
5135 (corrosion resistance of Ni-base casting alloys)
5228 (salt-bath corrosion of Ti)
5324 (corrosion resistance of metalized coatings)
5325 (passivation of Fe with HNO_3)
5510 (corrosion resistance of Be-Cu wire)
5707 (electric-resistance strain gages)
5799 (high-altitude corrosion effects)
5801 (H_2O_2 effects on various metals)
5816 (corrosion-resistant bronzes)
5921 (oil-ash analysis for corrosion prevention in diesel engines)
6194 (corrosion-inhibition phenomena)
6395 (chromate treated and painted Mg-alloy casting)

15. ANALYSIS—CHEMICAL AND PHYSICAL

5585 A Comparison of Several Methods for Determination of Non-Oil Constituents of Raw Linseed Oil. J. N. Shaw, J. W. Garrett, and S. O. Sorensen. *Journal of the American Oil Chemists' Society*, v. 29, Mar. 1952, p. 99-103.

Discusses methods and results.

5586 Rapid Method for Estimating Cement Content of Soil-Cement and Blended Cements. J. L. Gilliland and H. M. Hunter. *American Society for Testing Materials*, Feb. 1952, p. 29-30.

Titration of acid-soluble Ca and Mg provides a rapid method of determining the cement content of soil-cement mixtures and of blended cements. When samples of the individual constituents are available, accuracy compares favorably with that obtained by slower methods.

5587 Volatilization Rates of Elements in the Helium Direct Current Arc; Utilization of a Matrix for Biological Work. Bert L. Vallee and Ruth W. Peattie. *Analytical Chemistry*, v. 24, Mar. 1952, p. 434-444.

Volatilization rates of 31 elements were studied at 6 and 15 amp. for neutral atom lines and lines of the first ionization by the use of the moving-plate technique. Data permit evaluations of optimum analytical conditions on the basis of volatilization characteristics in air and helium and permit selection of internal standards. Numerous graphs and diagrams.

5588 Direct-Reading and Differential Frequency Meter for High Frequency Titrations. W. J. Blaedel and H. V. Malmstadt. *Analytical Chemistry*, v. 24, Mar. 1952, p. 450-454.

Describes above meter for high-frequency titrations by either the ordinary or differential technique, and presents schematic diagrams for the complete meter circuit.

5589 Selecting the End Point in High Frequency Titrations; Comparison of Differential and Ordinary Procedures. W. J. Blaedel and H. V. Malmstadt. *Analytical Chemistry*, v. 24, Mar. 1952, p. 455-459.

Discusses advantages of the differential method for cases where instrument and solution phenomena cause nonlinear response during a titration, and for resolving two end points

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lying close together. Describes 3 different titration procedures at 30 Mc. Illustrates a uniform-flow buret. Diagrams.

5590 Precipitation From Homogeneous Solution. Louis Gordon. *Analytical Chemistry*, v. 24, Mar. 1952, p. 459-462.

Compares the conventional or heterogeneous precipitation process to the above and discusses advantages of the latter in regard to less coprecipitation of interfering elements, greater ease of filtration and washing, and reduction of no. of fractionation steps. Tables and 37 ref.

5591 Spectrographic Analysis of Radioactive Materials. John G. Conway and Milton F. Moore. *Analytical Chemistry*, v. 24, Mar. 1952, p. 463-464.

Describes equipment developed for above, to eliminate health hazards. Utilizes an arc-spark chamber mounted in a gloved box with an accompanying filter system. Equipment usable for almost any toxic material. Photographs.

5592 Spectrographic Determination of Palladium, Platinum, Iridium, and Rhodium; Porous Cup Technique. Gilbert H. Ayres and Eugene W. Berg. *Analytical Chemistry*, v. 24, Mar. 1952, p. 465-469.

Describes a method for determination of Pd and for simultaneous determination of Pt, Ir, and Rh in solution. The working range for Pd is 5-160 ppm. Tables and graphs.

5593 Spectrochemical Determination of the Mineral-Element Content of Beef. Arthur J. Mitteldorf and Donald O. Landon. *Analytical Chemistry*, v. 24, Mar. 1952, p. 469-472.

Describes determination of the normal trace-element content of beef, and development of a spectrochemical method potentially useful for quantitative analysis of other organic materials. Nineteen elements, ranging in concentration from 0.001 ppm. of Cr to 270 ppm. of Mg were detected and determined. Tabular data.

5594 Spectrophotometric Determination of Silicon in the Presence of Zirconium, Beryllium, Aluminum, and Calcium. Anton B. Carlson and Charles V. Banks. *Analytical Chemistry*, v. 24, Mar. 1952, p. 472-477.

Utilizes the molybdenum blue method in a rapid procedure for determination of traces of Si; and presents a study of the factors that affect color development. Tables, charts, and 30 ref.

5595 Analytical Chemistry of Niobium and Tantalum: Critical Analysis of Existing Methods; Chlorination of Oxides and Those of Related Elements; Chlorination of Titania and Distillation Separation From Niobium and Tantalum. Russell H. Atkinson, Joseph Steigman, and C. F. Hiskey. *Analytical Chemistry*, v. 24, Mar. 1952, p. 477-488.

A critical review of the main separative reactions employed in the analysis of Cb and Ta minerals and a new atmospheric chlorination method applicable to the highest oxides of groups IV, V, VI, and VII of the periodic table. Describes use of the method in some separations, which lay the groundwork for a new system of analysis. Tables and 45 ref.

5596 Identification of Organic Acids on Paper Chromatograms. M. L. Buch, Rex Montgomery, and W. L. Porter. *Analytical Chemistry*, v. 24, Mar. 1952, p. 489-491.

Describes a method developed to produce color reactions for differentiation of certain groups of acid components. Tables and 16 ref.

5597 Chromatographic Separation and Determination of Dicarboxylic Acids, C_4 to C_{10}. Takeru Higuchi, Norman C. Hill, and Geraldine B. Corcoran. *Analytical Chemistry*, v. 24, Mar. 1952, p. 491-493.

Presents a method suitable for routine determination of sebacic, azelaic, suberic, pimelic, adipic, and lower straight-chain dicarboxylic acids in mixtures containing any or all of these acids. Chromatograms.

5598 Infrared Determination of Free Phenol in Phenol-Formaldehyde Resins. Joseph J. Smith, Frank M. Rugg, and Harry M. Bowman. *Analytical Chemistry*, v. 24, Mar. 1952, p. 497-498.

Describes a method for the above which can also be used to advantage in studying polycondensations of phenol and formaldehyde and the effects of free phenol on properties of phenolic resins. Spectrograms.

5599 Determination of Total Per Cent Aromatics in Heavy Petroleum Distillates; Modified Method Using Silica Gel Adsorption. A. T. Watson. *Analytical Chemistry*, v. 24, Mar. 1952, p. 507-509.

Presents a method suitable for routine application and particularly useful for studying the effects of process variables in solvent extraction of gas oils and lubricating oils. Tables.

5600 Rapid Potentiometric Determination of Chloride at Low Concentrations in Solutions of High Ionic Strength. W. J. Blaedel, W. B. Lewis, and J. W. Thomas. *Analytical Chemistry*, v. 24, Mar. 1952, p. 509-512.

Describes a routine method for detection of a limiting chloride concentration of 2×10^{-6} M in solutions containing about 1 M H_2SO_4 and/or Na_2SO_4. Nomogram, apparatus diagram, and table.

5601 Determination of Methyl Methacrylate by Oxidative Titration. Stephen Dal Nogare, L. R. Perkins, and A. H. Hale. *Analytical Chemistry*, v. 24, Mar. 1952, p. 512-515.

Describes a new procedure for the above for the free monomer. Notes that oxidative titration can be used also to determine styrene, acrylonitrile, and methyl acrylate in solution. Tables and graphs.

5602 Acidimetric Titration of Inorganic Salts in Glacial Acetic Acid. Charles W. Pifer and Ernest G. Wollish. *Analytical Chemistry*, v. 24, Mar. 1952, p. 519-520.

Inorganic salts were found to be acidic, neutral, or basic when dissolved in glacial acetic acid. A method for determination of this behavior is described which permits direct titration of a great number of inorganic salts. Tables.

5603 Determination of Small Amounts of Molecular Oxygen in Gases and Liquids. Francis R. Brooks, Martin Dimbat, Richard S. Treseder, and Louis Lykken. *Analytical Chemistry*, v. 24, Mar. 1952, p. 520-524.

Extends the MacHattie Maconachie method to the above, including nonaqueous liquids, with a precision of 5% over a wide concentration range. Apparatus diagram and tables.

5604 Determination of Rubber Hydrocarbon by a Modified Bromination Method. William J. Gowans and Frederick E. Clark. *Analytical Chemistry*, v. 24, Mar. 1952, p. 529-533.

Describes a procedure for the above applicable to natural rubber, and discusses factors affecting the bromination reaction. Tables and graphs.

5605 Separation of Beryllium From Biological Material. T. Y. Toribara and P. S. Chen, Jr. *Analytical Chemistry*, v. 24, Mar. 1952, p. 539-542.

Describes a new method for the above. Radioisotope Be^7 was used for the studies. Quantities of less than 10^{-10}g. could be separated completely from urine, soft tissues, and even bone if the extraction time were suitably increased. Tables and 11 ref.

5606 Spectrophotometric Determination of Zirconium. E. W. Kiefer and D. F. Boltz. *Analytical Chemistry*, v. 24, Mar. 1952, p. 542-544.

Presents a micro-method for the above, for 1-80 ppm. Table and graphs.

5607 Colorimetric Determination of Benzene Hexachloride. Milton S. Schechter and Irwin Hornstein. *Analytical Chemistry*, v. 24, Mar. 1952, p. 544-548.

Describes a new method for the above, applicable to as little as 5μg., and useful in analyses of spray residue and in pharmacological investigations. Tables, standard curves, apparatus diagram, and 24 ref.

5608 Spectrophotometric Determination of Inorganic Fluoride. A. D. Horton, P. F. Thomason, and F. J. Miller. *Analytical Chemistry*, v. 24, Mar. 1952, p. 548-550.

Describes a micro-method of the above, for amounts of 50 μg. or less. Gives standard curve and apparatus diagram. Apparatus includes automatically controlled steam-distillation setup.

5609 Bioassay of 1,2,3,4,5,6-Hexachlorocyclohexane (Lindane). Some Factors Influencing the Contact of Chemical and Test Insect and Methods for Standardizing the Process. W. M. Hoskins, J. M. Witt, and W. R. Erwin. *Analytical Chemistry*, v. 24, Mar. 1952, p. 555-560.

Describes procedures for use of houseflies in the above, and for removal of extractives from plant or animal tissues that interfere with the test. Graphs and table.

5610 Microtitration of Amines. Robert T. Keen and James S. Fritz. *Analytical Chemistry*, v. 24, Mar. 1952, p. 564-566.

Describes a method for the above involving acidimetric titration in non-aqueous solvents, for quantities as small as 20 μg., and useful for determining neutral equivalents in identification work. Graphs and tables.

5611 Estimation of Boron in Plant Tissue; Modification of Quinalizarin Method. Daniel MacDougall and D. A. Biggs. *Analytical Chemistry*, v. 24, Mar. 1952, p. 566-569.

Described modification increases effective range of the method from 0-2 to 0-8 μg. Tabular and graphical data and apparatus diagram.

5612 Separation of Organic Insecticides From Plant and Animal Tissues. Lawrence R. Jones and John A. Riddick. *Analytical Chemistry*, v. 24, Mar. 1952, p. 569-571.

Outlines a double-extraction procedure by which DDT, lindane, parathion, chlordan, methoxychlor, and Dilan are separated in milligram and microgram quantities. It is adaptable to recovery of a large variety of organic compounds from plant and animal tissues. Tables and 12 ref.

5613 Polarographic Determination of Small Amounts of Metals in Iron Pyrites. W. Charles Cooper and Paul J. Mattern. *Analytical Chemistry*, v. 24, Mar. 1952, p. 572-576.

A method for the above was developed applicable to Zn, Cu, Ni, and Co in a single sample. Procedure is rapid and accurate, and should find application in analysis of other iron-base materials. Polarograms, tables, and 13 ref.

5614 Detection of Micron and Submicron Chloride Particles. Ben K. Seely. *Analytical Chemistry*, v. 24, Mar. 1952, p. 576-579.

A sensitized-film method was developed to detect the presence and to study the concentration of individual chloride particles as small as 0.2 μ in the atmosphere. The extremely sensitive microchemical test developed can be applied to other fields of study, and is applicable to the detection of many ions other than chlorides. Photomicrographs.

5615 Determination of Cyanides in Refinery Waste Water. Maxey Brooke. *Analytical Chemistry*, v. 24, Mar. 1952, p. 583-584.

Describes colorimetric method for the above, sensitive in the range 0.5-3 ppm. It is applicable to other problems requiring the determination of trace quantities of cyanides.

5616 Direct Determination of Oxygen in Organic Compounds by Elementary Isotopic Analysis. A. V. Grosse and A. D. Kirshenbaum. *Analytical Chemistry*, v. 24, Mar. 1952, p. 584-585.

Authors' previously reported method is improved. Availability of heavy oxygen in the concentration range of 5-10 atom % now enables the ratio of two isotopes in the low-mass range to be measured precisely to the 6th decimal place by the Nier-Consolidated mass spectrometer. Table and 13 ref.

5617 Polarographic Determination of Low Concentrations of Silver. G. C. B. Cave and David N. Hume. *Analytical Chemistry*, v. 24, Mar. 1952, p. 588.

A brief account of a method for the above for a range of $5x10^{-6}$ to 0.01 M Ag.

5618 Furnace for Microdetermination of Oxygen in Organic Compounds. Al Steyermark, Michael J. McNally, William A. Wiseman, Richard Nivens, and Frank P. Biava. *Analytical Chemistry*, v. 24, Mar. 1952, p. 589-590.

Describes an automatic furnace for the above for the Unterzaucher method. Photograph and construction diagrams.

5619 Pittsburgh Conference on Analytical Chemistry. *Analytical Chemistry*, v. 24, Mar. 1952, p. 596-608.

Gives abstracts of papers presented at the above meeting, Mar. 5-7, 1952.

5620* Rapid Photometric Determination of Copper in Steels. (In German.) Walter Koch and Knut Behrens. *Archiv für das Eisenhüttenwesen*, v. 23, Jan.-Feb. 1952, p. 35-36; disc., p. 36.

Described modification of above eliminates the disturbing effects of Cr, Ni, and Co. Data are graphed and tabulated.

5621* Photometric Determination of Copper in Pig Iron and Unalloyed Steel. (In German.) Wilhelm Werz and Alfred Neuberger. *Archiv für das Eisenhüttenwesen*, v. 23, Jan.-Feb. 1952, p. 37-38.

Shows that precipitation of Cu with Na_2S is improved when performed in H_2SO_4 instead of HCl solution. The time required is 35 min. and the accuracy ±0.01%. Data are graphed and tabulated.

5622* Polarography With Alternating Currents. III. A.C. Polargraphy of Copper, Bismuth, Antimony, and Tin With Special Reference to the Presence of Halogen Ions. B. Breyer, F. Gutmann, and S. Hacobian. **IV. A.C. Polarography of Uranium, Iron, Nickel, and Manganese.** B. Breyer and S. Hacobian. **V. A.C. Polarography of Some Common Anions.** B. Breyer and S. Hacobian. *Australian Journal of Scientific Research*, ser. A, v. 4, Dec. 1951, p. 595-615.

20 references.

5623* Rapid Method of Determining Iron and Titanium Content in Ceramic Materials. (In German.) Hans Seiser. *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute, e.* V., v. 12, Dec. 1951, p. 699-703.

Gives details of volumetric and colorimetric procedures for the above.

5624 A Review of Phenol Analysis. Part II. Qualitative: Colorimetric (Inorganic) & Physical. *Chemical Age*, v. 66, Mar. 1, 1952, p. 333-336.

53 references.

5625 The Analytical Chemistry of Potassium. Part I. The Use of Inorganic Reagents. *Chemical Age*, v. 66, Mar. 22, 1952, p. 447-450.

Description of methods of estimating potassium, arranged in 3 main groups, inorganic, organic, and physical. Includes chlorplatinic acid, perchlorate, periodic acid, and K-Na cobaltinitrite precipitation methods. 54 ref. (To be continued.)

5626 A New Technique of Gas Sampling. F. W. Pritchard and W. H. Walton. *Chemistry & Industry*, Feb. 23, 1952, p. 166-167.

Involves sampling gases in coal mines. Describes method whereby the gas is pumped into a small metal vessel, sealed with a standard car tire valve and passed into analysis apparatus, which enables full advantage to be taken of the speed of direct-indicating analysis instruments.

5627* A New Apparatus for Direct Spectro-Chemical Analysis. A. Hans. *Engineers' Digest*, v. 13, Mar. 1952, p. 82. Translated and condensed from *Revue Universelle des Mines, de la Métallurgie des Travaux Publics des Sciences et des Arts appliques a l'Industrie*, ser. 9, v. 94, Dec. 1951, p. 448-451.

Previously abstracted from original.

5628* Studies on the Determination of Small Amounts of Carbon Monoxide in Synthetic Ammonia Gases. (In Japanese.) Yoshinobu Hosaka. *Reports of the Government Chemical Industrial Research Institute, Tokyo*, v. 46, May 1951, p. 95-102.

The hemoglobin method for the above was studied. Experimental results are summarized in English. 14 ref.

5629* Studies on the Spectrochemical Analysis of Silicates. I. Determination of Iron, Titanium, and Manganese in Silicates. II. Determination of Alkali-(Na, K) and Alkaline Earth (Ca, Mg) Metals in Silicates. III. Determination of the Major Constituents (Silica and Alumina) in Silicates. (In Japanese.) Keijiro Kuraoka, Kiyoshi Takahashi, and

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Kahoru Hara. *Reports of the Government Chemical Industrial Research Institute, Tokyo*, v. 46, Dec. 1951, p. 279-296.
14 references.

5630* Qualitative and Quantitative Determination of Metallic Ions Separated by Means of Paper Chromatography. (In German.) H. Seiler, E. Sorkin, and H. Erlenmeyer. *Helvetica Chimica Acta*, v. 35, Feb. 1, 1952, p. 120-128.
Describes experiments on making metal ions visible with the aid of violuric acid. The various colors of the violurates make qualitative analysis possible. The experiments show that planimetric interpretation of the chromatogram makes possible also the quantitative determination of alkaline and alkaline-earth ions. Typical data are tabulated and charted.

5631* Effect of Surface Active Substances on the Capacity of the Electric Double Layer. K. S. G. Doss and A. Kalyanasundaram. *Proceedings of the Indian Academy of Sciences*, v. 35, sec. A, Jan. 1952, p. 27-33.
Presents results of a detailed study of the effect of adsorption of a few surface-active substances on the capacity of the electrical double layer at the dropping mercury electrode. 15 ref.

5632 Analysis for Industry. Part 3. (Concluded.) William I. Stephen. *Industrial Chemist and Chemical Manufacturer*, v. 28, Mar. 1952, p. 107-109.
Reviews specialized methods and techniques on use of metallic reductors and reductor methods in analysis. 53 ref.

5633 Ion-Exchange Chromatography of Trace Components; A Design Theory. Theodore Vermeulen and Nevin K. Hiester. *Industrial and Engineering Chemistry*, v. 44, Mar. 1952, p. 636-651.
Outlines a quantitative calculation method for interpreting and predicting the performance of fixed-bed separation columns under the limiting condition of low relative concentration—i.e., under "trace" conditions. The proposed method is based upon a kinetic or diffusional approach and reduces under specified restrictions to a result given also by the equilibrium-plate theory of Mayer and Tompkins. 42 ref.

5634* Fundamental Reactions in the Vacuum-Fusion Method and Its Application to the Determination of O_2, N_2, and H_2 in Mo, Th, Ti, U, V, and Zr. H. A. Sloman, C. A. Harvey, and O. Kubaschewski. *Journal of the Institute of Metals*, v. 80, Mar. 1952, p. 391-407.
Deals with the application of the above method to 6 metals. The optimum conditions for each are discussed, and a mechanism for the reactions forming the basis of the method, derived from practical results and thermodynamical calculations, is postulated. Results showing the relation between gas contents and methods of preparation or subsequent treatments of the various metals are included, together with some observations on effects of the gaseous elements on their properties. Detailed derivations of thermodynamic data used are given in an appendix. Data are tabulated. 10 ref.

5635* Determination of Oil Content of Soluble Oil Dispersions. *Journal of the Institute of Petroleum*, v. 38, Jan. 1952, p. 58-68.
Presents report of Cutting Oils Panel of Standardization Sub-Committe No. 6—Lubricants. The method consists of splitting a known volume of soluble-oil dispersion with 20% HCl in a graduated flask and measuring the volume of oil liberated.

5636* Modern Techniques in Petroleum Testing. VII. The Estimation of Sulphur in Petroleum. D. Harvey. *Institute of Petroleum Review*, v. 6, Feb. 1952, p. 41-45.
Presents recommended procedures for the above. 12 ref.

5637* Modern Techniques in Petroleum Testing. VIII. Inorganic Analysis. B. W. Swanson. *Institute of Petroleum Review*, v. 6, Mar. 1952, p. 73-78.
A review. 28 ref.

5638 Absorptiometric Determination of Chromium in Iron and Steel. *Journal of the Iron and Steel Institute*, v. 170, Mar. 1952, p. 268-270.
Describes development of a direct method for determining low Cr contents in iron and steel, using the diphenylcarbazide-chromate reaction.

5639* New Methods in the Statistical Evaluation of Mine Sampling Data. Herbert S. Sichel. *Bulletin of the Institution of Mining and Metallurgy*, Mar. 1952; *Transactions*, v. 61, pt. 6, 1951-52, p. 261-288.
A new procedure, based on Fisher's Theory of Maximum Likelihood, is suggested as a replacement of the conventional arithmetic mean. It is shown that both the t estimator and the arithmetic mean are unbiased estimates of the true unknown average grade. The t estimator has the advantage of having a reliability higher than the arithmetic mean; being less sensitive to occasional high assays; and lying nearer to the true mean grade in the majority of cases. Tables facilitating computation of t are given in the appendix. 15 ref.

5640* Spectrochemical Slag and Ore Analysis. (In Swedish.) C. Georg Carlsson. *Jernkontorets Annaler*, v. 135, no. 12, 1951, p. 607-620.
A spectrochemical method previously described in English was tried for the determination of rock constituents of iron-ore concentrates. It was found necessary to incorporate a fluxing operation in order to convert all samples to the same mineralogical state. Typical results are tabulated, charted, and discussed.

5641* Determination of Chromium and Vanadium by Potentiometric Titration. (In Swedish.) Per Enghag. *Jernkontorets Annaler*, v. 135, no. 12, 1951, p. 621-634.
Dichromate and vanadate are reduced in the usual way by ferrous ammonium sulfate, the reduction being followed potentiometrically. It is shown that use of the electrode pair Pt-W involves some advantages over combinations of the type Pt-calomel, used previously. Results of application of the method to standard samples of steels and ferroalloys are tabulated. 18 ref.

5642* A Method for Determining Low Concentrations of Oxygen in Gases. I. A. McArthur. *Journal of Applied Chemistry*, v. 2, Feb. 1952, p. 91-96.
The method was developed primarily to determine the O_2 content of a plant gas containing 99% CO_2, but is also suitable for use with other gases, e.g. H_2, N_2, and CO. The amount of O_2 is measured by passing the gas through a known volume of dilute acidified chromous chloride solution and determining the resultant change in chromous-ion concentration. Accuracy has been proved over the range 5-55 ppm.

5643 The Rate-Determining Steps in Radial Adsorption Analysis. Leon Lapidus and Neal R. Amundson. *Journal of Physical Chemistry*, v. 56, Mar. 1952, p. 373-383.
Derives equations defining saturation of an initially empty radial adsorption disc as used in chromatographic analysis. Reports on validity as tested experimentally in 3 systems. Describes and illustrates technique. 22 ref.

5644* A New Method for the Colorimetric Estimation of Uranium With Resacetophenone-Oxime. M. Kantharaj Urs and K. Neelakantam. *Journal of the Scientific & Industrial Research*, v. 11B, Feb. 1952, p. 79-80.

5645 Chemical Analysis of Light Metals and Alloys. S. T. Payne. *Light Metals*, v. 15, Mar. 1952, p. 105-106.
Presents procedures for the analysis of Al and its alloys and Mg and its alloys. (To be continued.)

5646* Processes for the Determination of the Gas Content of Light Metals. I. Bases of the Determination Process. II. Plant Processes. III. Laboratory Processes. (In German.) H. Kostron. *Metall*, v. 6, Mar. 1952, p. 115-123.
Reviews the above on the basis of the literature. The process of extraction at high temperatures seems to provide the most accurate results, however, it is said to be too complicated for general use. Actually deals only with Al and its alloys. Need for further research and its probable direction are discussed. 38 ref.

5647* Analytical Applications of Trithiocarbonic Acid. I. Determination of Copper. (In German.) E. Gagliardi and W. Pilz. *Monatsheft für Chemie und verwandte Teile anderer Wissenschaften*, v. 83, Feb. 15, 1952, p. 54-59.
Includes tables giving typical data for above method. 12 ref.

5648 Use of Nuclear Plates for the Determination of the Uranium and Thorium Contents of Radioactive Ores. J. H. J. Poole and C. M. E. Matthews. *Nature*, v. 169, Mar. 8, 1952, p. 408-409.

Discusses above method, as suggested by D. H. Pierson in a recent paper, also some alternative procedures.

5649 A Sensitive Method for the Detection of Traces of Water in Oil. J. E. C. Stringer. *Nature*, v. 169, Mar. 8, 1952, p. 412.

Describes method which relies on the fact that perfectly dry air, arranged to stand over a "wet" oil, will take up moisture from the oil until the partial relative humidity of the air (at the prevailing room temperature) is the same as the volume concentration of the water in the oil. A "humidiscope" has been devised to determine this partial humidity.

5650* Radioactive-Tracer Techniques in Paper Chromatography. F. P. W. Winteringham, A. Harrison, and R. G. Bridges. *Nucleonics*, v. 10, Mar. 1952, p. 52-57.

Associating one or more radioisotopes with one or more substances separated on a paper chromatogram offers the possibility of quantitative, as well as qualitative, component analysis. Describes simple automatic device used to scan the paper radiometrically and locate the labeled substance.

5651 Modified J. Lawrence Smith Method for Analysis of Alkalies in Silicates. William T. Buckingham and Lawrence Koons. *Engineering Experiment Station News* (Ohio State University), v. 24, Feb. 1952, p. 29-31.

Describes above, which eliminates need for platinum ware and makes use of a newly-developed crucible furnace for decomposing the sample. Construction diagram and 15 ref.

5652 The Variation With Wavelength of the Spectral Emissivity of Iron and Molybdenum. Jack Eldon Taylor. *Journal of the Optical Society of America*, v. 42, Jan. 1952, p. 33-36.

Presents a study on the above. A gradual rise in the emissivity of both metals was observed as the blue end of the spectrum is approached. The increase in the emissivity of iron with decrease in wavelength is much greater than that observed for molybdenum. The emissivity of iron in the body-centered form at temperatures below 1178°K is observed to be higher at all wavelengths than it is for the higher-temperature face-centered-cubic form.

5653 Analysis of the Excitation Characteristics of Spectra Emitted by Ferrous Alloys. J. K. Hurwitz and J. Convey. *Journal of the Optical Society of America*, v. 42, Jan. 1952, p. 24-30.

The excitation potentials of the observed wavelengths of the spectral lines emitted in low-alloy-steel spectra are calculated. The slopes of the working curves were found to be independent of alloying elements, matrix, and discharge conditions. Alterations in the circuit parameters and consequent changes in the discharge had little or no influence upon the intercept of the working curves. 19 ref.

5654 Analytical Methods for the Determination of Cyanates in Plating Wastes and in Effluents From Treatment Processes. Barnett F. Dodge and Walter Zabban. *Plating*, v. 39, Apr. 1952, p. 381-384.

Several methods were studied and it was finally concluded that the use of Nessler's reagent was both the simplest and the shortest. Details of work are tabulated, charted, and discussed. Recommended routine procedure is described in detail.

5655* Applications of Chromatography to Petroleum Production Research. F. W. Preston and J. C. Calhoun. *Producers Monthly*, v. 16, Mar. 1952, p. 22-25, 28-32.

Discusses the above, describing the theory of chromatography and reviewing the literature. Chromatography may be applied to analysis of natural-gas or petroleum mixtures, or as the basis for new refining processes. 46 ref.

5656* Mass Spectrometric Determination of Deuterium in Organic Compounds. (In English.) D. H. W. Den Boer and W. A. J. Borg. *Recueil des Travaux Chimiques des Pays-Bas*, v. 71, Jan. 1952, p. 120-124.

11 references.

5657* Lead Determination in Zinc Oxides Prepared According to the French Process. (In French.) J. Prelaz. *Revue Générale du Caoutchouc*, v. 29, Jan. 1952, p. 44-45.

Gives details of 2 methods which give reproducible results. Maximum lead content is set at 0.1% for ZnO used in rubbers.

5658* The Determination of Phosphorus and Sulfur in Acetylene by Means of Combustion. (In German.) J. Lösch. *Schweissen und Schneiden*, v. 4, Jan. 1952, p. 21-22.

Proposes an improved method for the above, applicable also to the determination of phosphorus and sulfur in other carbon-containing compounds, and for organic substances which evaporate readily.

5659* Automatic Microdetermination of Carbon and Hydrogen (by Combustion in a Nitrogen Atmosphere According to the Method of Niederl and Whitman). (In French.) M. Mangeney. *Bulletin de la Société Chimique de France*, Nov.-Dec. 1951, p. 809-820.

Discusses the above with respect to apparatus used and working methods. Includes diagrams and tables. 32 ref.

5660* Chromatographic Behavior of Copper, Nickel, and Cobalt on Paper. Qualitative and Quantitative Determination. (In French.) A. Lacourt, Gh. Sommereyns, O. Jacquet, and G. Wantier *Bulletin de la Société Chimique de France*, Nov.-Dec. 1951, p. 873-880.

New paper-chromatographic microgram scale separations of Cu, Ni, and Co were studied, with new solvents and a new development technique. The research was applied to solutions of different kinds, and also to mixtures containing these cations in different proportions. Includes tables and graphs.

5661* Circulation Cell for Electrolysis on a Mercury Cathode. (In French.) Henri Bozon and Suzanne Bozon. *Bulletin de la Société Chimique de France*, Nov.-Dec. 1951, p. 917-918.

Discusses the above, giving a description of the cell and its method of operation. Includes diagram.

5662* Determination of Aluminum in Ferrosilicon and Silicoaluminum. (In French.) Henri Bozon and Suzanne Bozon. *Bulletin de la Société Chimique de France*, Nov.-Dec. 1951, p. 926-927.

Describes three methods for the above, and discusses their relative merits.

5663* Study of the Precipitation of Lead Tungstate in Solutions of Sodium Tungstate, Acidified by Nitric Acid and Hydrochloric Acid. (In French.) Ali Riza Berkem. *Bulletin de la Société Chimique de France*, Nov.-Dec. 1951, p. 927-931.

Presents a brief discussion of the above. Includes tables and charts.

5664* Contribution to the Study of the Phenomena of Condensation in Mineral Chemistry. VII. Generalized Relations Between Cryoscopic and Potentiometric Titration Curves in a Heterogeneous Mixture. Pierre Souchay and Monique Teyssedre. *Bulletin de la Société Chimique de France*, Nov.-Dec. 1951, p. 938-951.

Presents details of theoretical, mathematical analysis of the above, including graphical presentation. 41 ref.

5665* Microdetermination of Gold. (In German.) Ladislaus Erdey and Georg Rady. *Fresenius' Zeitschrift für analytische Chemie*, v. 135, no. 1, 1952, p. 1-10.

Describes application of dithizone as reagent for above purpose. Means of eliminating the disturbing effect of foreign metals are discussed; and it is shown that the process is well suited to the rapid determination of gold in ores, scrap, etc. Incldues tables, graphs, and references.

5666* Tellurium-Selenium Aanalysis. (In German.) **Report I. A New Colorimetric Process for Determination of Tellurium.** Karl Geiersberger and Annemarie Durst. **Report II. Determination of Selenium in Tellurium and of Tellurium in Selenium. Report III. Simultaneous Quantitative Determination of Selenium and Tellurium.** Karl Geiersberger. *Fresenius' Zeitschrift für analytische Chemie*, v. 135, no. 1, 1952, p. 11-22.

15 references.

15. *Analysis—Chemical and Physical*

5667* Determination of Sulfide Sulfur in Blendes and Roasting Residues. (In German.) Ernst Eberius. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 4. Dec. 1951, p. 460-462.

Proposes an improvement for the method used customarily for the above. Details of the testing method are indicated; data are tabulated.

Miscellaneous Publications

5668 Rapid Determination of Total Organic Matter in Soils by Ceriometry. J. de la Rubia Pacheco and F. Blasco Lopez-Rubio. *Fourth International Congress of Soil Science, Transactions*, v. 2, 1950, p. 101-104. (S590 I8t4)

Describes the application of ceriometric techniques to the rapid determination of total organic matter in soil. 18 ref.

5669 The Determination of Organic Carbon in Soils by Dichromate Mixtures. Joseph Tinsley. *Fourth International Congress of Soil Science, Transactions*, v. 1, 1950, p. 161-164. (S590 I8t4)

Presents a procedure for the above. 10 ref.

5670 A Cooperative Investigation of Precision and Accuracy in Chemical, Spectrochemical and Modal Analysis of Silicate Rocks. H. W. Fairbairn and others. U. S. Geological Survey, Bulletin 980, 1951, 69 pages. (QE75 Un3b)

An investigation by staff members of Department of Geology, Massachussetts Institute of Technology, in collaboration with Office of Naval Research, Washington, D. C.; Geophysical Laboratory, Carnegie Institution of Washington; and Geochemistry and Petrology Branch, U. S. Geological Survey. Numerous graphs and tables.

See also

5331 (analysis of plating solutions—book)
5678 (photoelectric photometry)
5680 (automatic micropipets and micropycnometers)
5939 (determination of Cr in Sn glazes)
5993 (base-exchange studies on clays)
6067 (identification of bitumens)
6119 (potential of electrocapillary maximum of Hg)
6123 (boron determination)
6135 (Al oxides for chromatographic analysis)
6239 (analysis of heavy water—book)
6301 ("Adsorption and Chromatography"—book)
6384 (analysis of fumes from paint)
6388 (identification of drying oils)
6409 (microbioassay of insecticides)
6427 (boron determination in plants)
6467 (spectroscopy of isotopes)
6742 (silicate analysis—book)

16. APPARATUS, METHODS, AND STANDARDS

5671* Determination of Elastic Constants of Crystals From Diffuse Reflections of X-Rays. II. Application to Some Cubic Crystals. (In English.) G. N. Ramachandran and W. A. Wooster. *Acta Crystallographica*, v. 4, Sept. 1951, p. 431-440.

Formulas required to deduce the elastic constants of cubic crystals from observations of diffuse reflections are derived from the general theory. Intensities of the diffuse reflections corresponding to points in reciprocal space distributed along various lines are compared. The method was applied to KBr, KCl, $NaClO_3$, galena, and hexamethylenetetramine. Data are tabulated and charted. 18 ref.

5672* Diffraction of X-Rays by Structures in Disordered Layers. I. (In French.) G. W. Brindley and J. Mering. *Acta Crystallographica*, v. 4, Sept. 1951, p. 441-447.

While the approximations in the theoretical treatments of X-ray diffraction by 2-dimensional gratings are in many cases valid and justify application of the resultant formulas (in particular the Laue-Warren formulas) to the interpretation of experimental data, in certain cases a more detailed treatment is required. The present paper is concerned with variation of the structure factor within the zone of integration involved in determining the reflected intensity from a random powder of 2-dimensional gratings. Application of the formulas derived is discussed in relation to a wide variety of cases. 12 ref.

5673* Diffraction Effects in X-Ray Fourier Syntheses Due to Non-Observed "Weak Reflections". (In English.) Arne Magnéli. *Acta Crystallographica*, v. 4, Sept. 1951, p. 447-450.

Shows that a crystal structure in which displacements of certain atoms suddenly occur at long, regular intervals gives strong X-ray reflections only in the close vicinity of reciprocal-lattice points, corresponding to the period of the basic sublattice. If the remaining reflections, which may be very weak, are not detectable by the experimental method applied, then larger diffraction effects can appear in the Fourier calculations of the electron-density function based on the observed X-ray data.

5674* Optical Methods in X-Ray Analysis. II. Fourier Transforms and Crystal-Structure Determination. (In English.) H. Lipson and C. A. Taylor. *Acta Crystallographica*, v. 4, Sept. 1951, p. 458-462.

The optical apparatus described in Part I can be used to determine experimentally the Fourier transforms of 2-dimensional projections of atomic arrangements. Methods of using these transforms to determine crystal structures are surveyed; and examples of their application to certain known structures are described. Ways of extending this process of direct crystal-structure determination are discussed. 16 ref.

5675* Portrayal of Relief of Time-Frequency Spectra by Photographic Differentiation. (In German.) Werner Meyer-Eppler. *Akustische Beihefte*, no. 1, 1951, p. 1-3.

The special distribution of energy both in frequency and time is usually protrayed by dark or bright patterns of varying shades. A third method is suggested: relief portraying, which represents not only the spectral amplitude but also its time derivative, giving considerably higher resolution of fine structures. Illustrated.

5676 Objective Test Methods for Paint Brushes. M. J. Snyder, E. R. Hunt, and J. W. Clegg. *American Society for Testing Materials Bulletin*, Feb. 1952, p. 31-34.

Describes equipment and methods developed for the above. The tests were conducted on 3- and 4-in. brushes to determine the amounts of paint picked up and deposited by the brushes, numerical measures of the quality of the paint films laid down, measurement of brush stiffnesses, and coefficients of friction between brushes and surfaces to be painted. Apparatus is diagrammed and illustrated; typical results are charted.

5677 Abradoflex—Abrasion Resistance Tester. M. C. Shaw. *American Society for Testing Materials Bulletin*, Feb. 1952, p. 49-52.

Describes and illustrates wearability testing machine developed for asbestos textiles and other fabrics, particularly the heavier grades. The destructive actions of abrasion, flexing, and creasing are simultaneously applied to cloths under test and the resulting degradation evaluated in terms of loss in tensile strength.

5678 Reliability of Photoelectric Photometry. N. T. Gridgeman. *Analytical Chemistry*, v. 24, Mar. 1952, p. 445-449.

Develops theory of precision of the commoner instruments, as influenced by the concentration of the measured solutions, to yield a general expression of which all valid expressions in the literature are shown to be special cases. Includes an empiricized "error curve", discussion of the influence of solution strength on accuracy, and an interpretation of the precision of the transmittance-ratio technique. Graphs and 17 ref.

5679 Quantitative Electrodeposition of Plutonium. Harold W. Miller and Richard J. Brouns. *Analytical Chemistry*, v. 24, Mar. 1952, p. 536-538.

Describes a quantitative procedure whereby uniform, adherent films of plutonium dioxide, from tracer amounts to about 9 mg., were deposited completely from solutions in 2 hours' time. Such films are particularly suited for isotopic analysis and preparation of counting standards. Apparatus diagram and tables.

5680 Automatically Adjusting Micropipets and Micropycnometers. Herbert H. Anderson. *Analytical Chemistry*, v. 24, Mar. 1952, p. 579-583.

Describes the filling of a micropipet so as to greatly extend the

useful range; a dilution pipet; a method for titrating the acidity available in the contents of a micropipet; and designs of 0.3- to 1.1-ml. pipets, and of micropycnometers. Apparatus diagrams and 19 ref.

5681 High-Stability Regulator for Light Sources. Marvin J. Johnson. *Analytical Chemistry*, v. 24, Mar. 1952, p. 609-610.

Discusses the principle and describes construction and operation of the above, applicable to low-wattage sources. Circuit diagram.

5682* Nondestructive Materials Testing by Means of Ultrasonics Using the Transit-Time Echo Process. (In German.) Adolf Lutsch. *Archiv für das Eisenhüttenwesen*, v. 23, Jan.-Feb. 1952, p. 57-65.

Describes process which illustrates how it can be used to determine grain structure and detect defects in metals. Includes tables, graphs, diagrams, photographs, and micrographs. 21 ref.

5683* Properties and Applications of Commercial Electrical Strain Gages. (In German.) Kurt Fink and Christof Rohrbach. *Archiv für das Eisenhüttenwesen*, v. 23, Jan.-Feb. 1952, p. 75-80; disc., p. 80-81.

Different types of strain gages were investigated. Circuits are illustrated; data are graphed and tabulated.

5684* Atomic Energy Instrumentation. C. D. Florida and W. R. Loosemore. *Atomics* (London) v. 3, Mar. 1952, p. 67-75.

A conference was held last year at the Atomic Energy Research Establishment, Harwell, England, to review the latest advances made in electronic equipment and techniques as used in the atomic-energy projects of the U. S., Canada, and Great Britain. Diagrams and graphs. 12 ref.

5685 Cast Aluminium Alloys. *Automobile Engineer*, v. 42, Mar. 1952, p. 100.

Provides a table for reference to the standard designations and trades names of related specifications.

5686* Measuring the Temperature of a Flux During Its Melting. (In Russian.) M. M. Timofeev. *Avtogennoe Delo*, v. 22, July 1951, p. 26-27.

A tungsten-graphite thermocouple and arrangement for measuring the temperature of welding-rod coatings is described and illustrated. A calibration curve is given.

5687 Radiochemical Measurements of Activity Coefficients in Mixed Electrolytes. R. H. Betts and Agnes N. MacKenzie. *Canadian Journal of Chemistry*, v. 30, Feb. 1952, p. 146-162.

A method is described for precise measurement of activity coefficients of salts in mixed electrolytic solutions. Involves the use of synthetic ion-exchange resins and radioactive tracers. Activity coefficients of the chlorides of Na, K, Rb, and Cs were measured at effectively zero concentration in HCl solutions from 0.005 to 1.5M.

5688 A Linear Radio-Frequency Mass Spectrometer. P. A. Redhead. *Canadian Journal of Physics*, v. 30, Jan. 1952, p. 1-9.

Above instrument uses a system of electrodes similar to a linear accelerator to obtain velocity selection of tin ions. A retarding field region prevents all ions, except those with maximum energy, from reaching the collector. An ion beam of large cross section is used. With 20 r.f. stages, a mass resolution of 1% is obtained. 14 ref.

5689 Design and Use of a Coincidence Circuit of Short Resolving Time. R. E. Bell, R. L. Graham, and H. E. Petch. *Canadian Journal of Physics*, v. 30, Jan. 1952, p. 35-52.

A coincidence circuit for use with anthracene or scintillation counters is described. Its resolving time lies in the 10^{-8} sec. range, in agreement with theoretical estimates of minimum possible resolving time. Examples are given of use of the circuit in measurement of short gamma-ray half-lives and, in conjunction with beta-ray spectrometers, in determination of details of radioactive distintegration schemes. 19 ref.

5690 A New Method for Liquid Film Thickness Measurement. A. M. Pennie and J. Y. Belanger. *Canadian Journal of Technology*, v. 30, Feb.-Mar. 1952, p. 9-19.

The method is accurate and sensitive and employs a micrometer needle in conjunction with an electrical method for detection of the point of contact.

5691 Advantages of X-ray Inspection. J. Rigby. *Canadian Metals*, v. 15, Apr. 1, 1952, p. 36-37.

A brief discussion of the above under the topics of limitations of X-rays, flaw location, scatter effects, penetration, fluoroscopy, and limitation of radiography. Gamma radiography is included, noting that radioisotopes are adding versatility by offsetting cost, portability, and range limitations.

5692 New Salt Process Omits Usual Problems. R. B. Richards. *Chemical Engineering*, v. 59, Mar. 1952, p. 140-141, 143.

Describes the above for the separation and refining of rock salt and other mixed salts. Flow diagram.

5693 Convenient Flowmeter Conversions. David P. Herron. *Chemical Engineering*, v. 59, Mar. 1952, p. 142-143.

Demonstrates the feasibility of calibrating any flowmeter with the most convenient fluid at hand (e.g., air or water) and of converting the calibration so obtained to any other fluid without loss of accuracy.

5694* Wire-Form Anticathodes. (In French.) Jean Barraud. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Feb. 4, 1952, p. 614-616.

Discusses the above in which a very thin metallic wire stretched along the path of an electron beam is used as an anticathode; very narrow X-ray focusing can thus be obtained. This apparatus is especially applicable in radiography. Includes diagram.

5695* Note on the Efficiency of Detection of X-Rays by Scintillation Counters. (In French.) Henri Piatier. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Feb. 25, 1952, p. 939-941.

Presents a formula for calculation of the above effectiveness in the case where the Compton effect alone is practically responsible for the detection. Includes chart.

5696* Temperature/Resistance Chart for Electrical Copper. A. E. Maine. *Electronic Engineering*, v. 24, Mar. 1952, p. 111.

Above chart is designed for determing rapidly the change of resistance with temperature of a unit wound with copper wire. Alternatively, the new temperature may be found from knowledge of the original temperature and the ratio of resistance change.

5697* A Recording and Integrating Flowmeter. D. C. Pressey. *Electronic Engineering*, v. 24, Mar. 1952, p. 112-116.

The above is described whereby rapidly varying flow-rates may be measured or recorded together with the volume which has passed. It comprises a simple flow resistance transforming flow rates to pressures, an electrical capacitance manometer of variable sensitivity, and an electrical integrator to give volume readings. Diagrams. 18 ref.

5698* Proportional Temperature Control. R. Scott. *Electronic Engineering*, v. 24, Mar. 1952, p. 117.

Describes a proportioning arrangement which, under equilibrium conditions, controls power dissipation in a heater so that thermal losses are accurately balanced. Diagram.

5699* An Electrical Flowmeter for Recording Blood Flow. I. G. Baxter. *Electronic Engineering*, v. 24, Apr. 1952, p. 162-165.

Apparatus described and diagrammed was designed for continuously recording the rate of flow of blood to the lungs of an animal in connection with research on respiration.

5700* Industrial Applications of an Electronic Position Control Servo-Mechanism. J. L. Gray. *Electronic Engineering*, v. 24, Apr. 1952, p. 196-198.

Surveys a few of the above, including cloth guilding and selvedge slitter in the textile industry, web guiding and cardboard trimming in the paper industry, and constant tension devices in cable manufacture. Diagram and illustrations.

16. *Apparatus, Methods, and Standards*

5701 Rating New Test Methods. Eugene D. Goddess. *Electronics*, v. 25, Apr. 1952, p. 101-103.

Describes new statistical sampling technique which reduces time and money spent in assembling electronic products that are foredoomed to be rejects. Basis is simple J-index for evaluating different methods of testing component parts before assembly.

5702 Ultrasonic System Detects Intruders. Stanley Kempner. *Electronics*, v. 25, Apr. 1952, p. 104-105.

Volumes up to 20,000 cu.ft. can be protected by a single system of one transmitter and one receiver. Motion of an object within space changes frequency of energy reflected from object, setting off alarm. Circuit diagrams.

5703 Ferroresonant Flip-Flops. Carl Isborn. *Electronics*, v. 25, Apr. 1952, p. 121-123.

Describes carrier-frequency system which permits count rates up to 100,000 per sec. with a 2-mc. carrier. Power consumption of decade with neon indicators and no tubes and no diodes is only one watt due to reactive nature of elements.

5704 Servo Drive for Oscillograph Motor. H. R. Holsinger and C. E. Smith. *Electronics*, v. 25, Apr. 1952, p. 128-131.

D.c. drive motor is held at constant speed when error-signal spikes superimposed on sawtooth pulses remain fixed. Principle is used to extend useful range of mirror oscillograph between 50 and 250 cps. and can be applied to other industrial control problems. Diagrams and illustrations.

5705 Crack-Detector for Wire Threads. John H. Jupe. *Electronics*, v. 25, Apr. 1952, p. 226.

Describes new crack detector of French origin which has many applications in connection with manufacture of radio tubes, picture tubes, and electric light bulbs because it can be used for thin wires. Diameters from 0.8 to 32 mm. can be handled irrespective of whether they are insulated or nonmagnetic.

5706* The Potential Flow Tank. E. Markland and N. Hay. *Engineering*, v. 173, Mar. 7, 1952, p. 292-294.

Describes the above used to solve many problems arising in engineering practice. The seepage of water through earth dams, estimation of the critical Mach number of an aircraft-spinner and engine-cowling combination, and elastic torsion of noncircular shafts have all been investigated by this method. Diagrams. 11 ref.

5707* A New Development in Bonded Electric Wire Resistance Strain Gauges. A. U. Huggenberger. *Engineers' Digest*, v. 13, Mar. 1952, p. 77-79. (Translated and condensed from *Schweizer Archiv für angewandte Wissenchaft und Technik*, v. 17, Nov. 1951, p. 321-332.)

Previously abstracted from the original.

5708* Manometric Measurement of Gas Evolution in High Temperature Reactions. (In English.) S. Patai. *Experientia*, v. 8. Feb. 15, 1952, p. 76-78.

The apparatus described and diagrammed was devised for the study of the kinetics of gas evolution from solid-phase reactions in the range of 150-500°C. It can, however, be equally well applied for investigation of the thermal decomposition of solids or of reactions between solids and gases; and, in general, for all reactions accompanied by changes of pressure.

5709 A Gauge for Testing Metal Coating Thickness Suitable for Use With Paints, Ceramic Coatings, Plastics or Paper. *Finish*, v. 9, Apr. 1952, p. 17.

Thickness of coatings can now be measured within 0.0005 in. accuracy by a new instrument built by the Ryan Development Laboratory and designed by the National Bureau of Standards.

5710* The Development of a Temperature Limit and Overheat Control. N. D. B. Harris. *Gas Journal*, v. 269, Feb. 27, 1952, p. 525-528.

Describes the above and its uses. Discusses various metal combinations used in the cut-off system. Diagrams.

5711* Piezoelectric Method of Measuring Air-Pressure Fluctuations. (In German.) J. Schaffhauser. *Helvetica Physica Acta*, v. 24, Dec. 31, 1951, p. 591-595.

A sensitive device for measuring and recording the above is briefly described and illustrated.

5712* A New Method for Surface Flaw Detection. *Industry & Welding*, v. 25, Apr. 1952, p. 79-80.

Describes the Faxfilm process in which an exact reverse replica of a test surface is quickly made in clear plastic. Projection of this replica in a micro-projector provides a magnified representation of the surface, with marked 3-dimensional effect.

5713* The Opaque-Stop Microscope as a Means of Studying Surface Relief. W. M. Lomer and P. L. Pratt. *Journal of the Institute of Metals*, v. 80, Mar. 1952, p. 409-411.

Describes and illustrates some results obtained by the above method as applied to metallic and nonmetallic surfaces.

5714* Balance Methods For the Measurement of Permittivity in the Microwave Region. T. J. Buchanan. *Institution of Electrical Engineers Proceedings*, v. 99, pt. 3, Mar. 1952, p. 61-66.

A method was developed for measurement of the vector permittivity of water and other high-loss liquids. Describes apparatus constructed for making measurements on water and aqueous solutions at wavelengths of 3.2 and 1.26 cm.

5715 Fundamental Techniques for Calibrating Hygrometers. Arnold Wexler and W. G. Brombacher. *Instrumentation*, v. 5, 1st qtr., 1952, p. 25-27.

Includes tables, diagrams, and illustrations. 11 ref.

5716 Optimalizing System for Process Control. (Concluded.) Y. T. Li. *Instruments*, v. 25, Mar. 1952, p. 324-327, 350, 352, 354, 356, 358-359.

Presents and anlayzes the above, using an engine as the process unit, which is held to an optimum output by control of 1 or 2 variables. Includes circuit diagrams, components of ocntrol system, and graphs showing performance of an engine operating with the experimental optimalizing-control system.

5717 Instrument Electronics. Milton H. Aronson. *Instruments*, v. 25, Mar. 1952, p. 328-331.

Discusses the factors of classification, distoration, and coupling with respect to amplifiers. (To be continued.)

5718 Electrical Transmitting and Transducing of Process Measurements. C. Garland Roper. *Instruments*, v. 25, Mar. 1952, p. 338-341, *I. S. A. Journal*, v. 8, p. 25-28.

Work directed towards simplifying the task of combining the advantages of electrical and mechanical measurements is outlined. Diagrams show details of instrument construction.

5719* Determination of the "Extinction Coefficient"—Particle Size Relationship for Spherical Bodies. H. E. Rose. *Journal of Applied Chemistry*, v. 2, Feb. 1952, p. 80-88.

Above relationship, which is used as the basis for a method of determining the size characteristics of powders in the subsieve range, was studied experimentally and theoretically. 12 ref.

5720 Diffraction Measurements at 1.25 Centimeters. Ralph D. Kodis. *Journal of Applied Physics*, v. 23, Feb. 1952, p. 249-255.

Describes above, made near obstacles whose characteristic dimension is comparable to above wavelength. Measured distributions of phase and amplitude of the electric field near long cylinders of brass and polystyrene were obtained; and, for the conducting cylinders, compared directly with results of a suitably modified theory. Technique was extended to diffraction by a semi-infinite conducting plane screen. Data are graphed.

5721 Analysis of Certain Errors in the X-Ray Reflection Method for the Quantitative Determination of Preferred Orientations. Warren P. Chernock. *Journal of Applied Physics*, v. 23, Mar. 1952, p. 341-345.

The reflection method for quantitative determination of pole figures, proposed by Schulz, proved to be limited with respect to the range of tilting angles in which satisfactory results can be obtained. It is shown that the previously unexplained de-

crease in the diffracted intensity with increasing tilting angle for specimens with random orientation distribution can be accounted for on the basis of an elementary analysis of defocusing effects. The importance of accurate specimen alignment is discussed, and a satisfactory alignment check procedure is described.

5722* Spun Glass Air Filters for Bacteriological Cabinets, Animal Cages, and Shaking Machine Containers. Herbert M. Decker, Francis A. Geile, J. Bruce Harstad, and Noel H. Gross. *Journal of Bacteriology*, v. 63, Mar. 1952, p. 377-383.

Describes, diagrams, and illustrates above unit having a capacity of 250 cu. ft. of air per min. and capable of removing 99% of the test organisms from an air stream. An animal cage having a spun-glass filtered air supply was developed. Use of this cage may prevent possible cross-contamination and avoid release of pathogens to the atmosphere. A shaking-machine container is described which completely encloses the flask, yet provides sufficient air for satisfactory bacterial growth. 10 ref.

5723 A Design for Standard Resistance Coils. C. R. Barber, A. Gridley, and J. A. Hall. *Journal of Scientific Instruments*, v. 29, Mar. 1952, p. 65-69.

A new method for the construction of resistance coils especially suitable for use in bridge construction is described. Full details of methods used in the construction and in heat-treatment of the wire in order to obtain good stability are given. Manganin wire is used.

5724 A Single Channel Pulse Amplitude Analyser For Measurement of Coincident Pulses. R. Wilson. *Journal of Scientific Instruments*, v. 29, Mar. 1952, p. 70-72.

An instrument is described which has been used to select events when a pulse of a definite amplitude is coincident in time with another pulse of a definite amplitude, both in the presence of pulses of other amplitudes. Useful in nuclear physics experiments. Circuit diagram.

5725 A Monitor For Measuring X-Ray Beam Intensities. C. M. Hargreaves, E. Prince, and W. A. Wooster. *Journal of Scientific Instruments*, v. 29, Mar. 1952, p. 82-85.

Includes circuit and schematic diagrams.

5726 Toroidal Geiger Counters. N. G. Trott. *Journal of Scientific Instruments*, v. 29, Mar. 1952, p. 87-88.

The construction and testing of 2 new forms of the above are described. Briefly describes experiments with 2 counters enclosed in the same vessel and operated in coincidence.

5727 A Magnetic Thickness Gauge of New Design. E. G. Harrison. *Journal of Scientific Instruments*, v. 29, Mar. 1952, p. 89-91.

The instrument described employs a movable permanent magnet to produce the balancing force, but the same magnet also serves to energize the soft-iron armature. Accuracy compares favorably with that of other instruments. Modifications are described whereby the range may be extended in both directions.

5728 A Servo-Controlled Constant-Stress Rheometer. E. N. Thrower. *Journal of Scientific Instruments*, v. 29, Mar. 1952, p. 91-93.

Constructional details are given for above instrument suitable for investigation of rheological properties of highly viscous materials. The instrument is suitable for investigating the range 10^7 to 10^{12} poises.

5729 Magnetic Focusing With A Prolate Spheroidal Field—Details of a β-Spectrometer and Magnet. H. O. W. Richardson. *Journal of Scientific Instruments*, v. 29, Mar. 1952, p. 93-95.

Constructional details are given of the above. Discusses dependence of magnetizing power consumption on size of instrument and on momentum focused.

5730 A Modified Thermostatic Controller. E. D. Lacy. *Journal of Scientific Instruments*, v. 29, Mar. 1952, p. 96.

Briefly describes improved instrument for control of a small laboratory tube furnace.

5731 New Steel Compositions to Conserve Critical Alloying Elements. *Materials & Methods*, v. 35, Mar. 1952, p. 121.

Tables supplement data published in the Oct. 1951 issue. Covers standard steels; new steels developed to conserve nickel; alternate boron steels; and tentative-standard boron steels.

5732* Electromagnetic Thickness Gages Using a Magnetic Circuit. (In German.) J. H. Zaat. *Metalloberfläche*, ser. A, v. 5, Dec. 1951, p. A185-A191.

Discusses investigations carried out using a magnetic circuit, on nonferromagnetic layers. Results are discussed, tabulated, and charted; possibilities of errors are indicated.

5733 Nuclear Reaction Radiography and Auto-Radiography of Metals. Mats Hillert. *Metal Treatment and Drop Forging*, v. 19, Mar. 1952, p. 135-137.

Describes briefly the new radiographic method called nuclear reaction radiography, with particular reference to the examination of an Fe-B alloy. A number of controlling factors for good results are discussed. Photomicrographs.

5734* Physical Aspects of the Testing of Metals by Means of Ultrasonics. (In French.) H. J. Seemann. *Métaux: Corrosion—Industries*, v. 27, Jan. 1952, p. 14-23.

Discusses the problem of the absorption and dispersion of ultrasonic waves in solid bodies of polycrystalline structure, on the basis of the literature. Data are tabulated and charted. 17 ref.

5735* The Belgian Method of Ultrasonic Testing of Materials. (In French.) G. A. Homes, Y. Ots, and E. Symon. *Métaux: Corrosion—Industries*, v. 27, Jan. 1952, p. 24-33.

Describes above method and apparatus used. Application, particularly for the detection of lamination, is indicated; typical examples are cited. The value of the method is outlined. Schematic diagrams and photographs illustrate the article.

5736* Magnetic and Electrical Processes for Nondestructive Testing of Metallic Pieces. (In French.) Werner Jellinghaus. *Métaux: Corrosion—Industries*, v. 27, Jan. 1952, p. 34-43.

Reviews and evaluates above processes on the basis of the literature; apparatus is illustrated by circuit and schematic diagrams. 15 ref.

5737* Testing of Packaging Materials. *Modern Lithography*, v. 20, Mar. 1952, p. 38-40.

Describes 3 new tests proposed by Packaging Institute for checking effects on lithographed or printed packages of alkali products, light, and other factors.

5738 Electronic Shock-Tester. J. A. Sargeant. *Modern Packaging*, v. 25, Mar. 1952, p. 261-263.

Describes the above. It senses, measures, and records the precise degree of shock and vibration within a container under test.

5739 Sensitive Mercury-Level Detecting Unit for Manometers. W. E. Williams, Jr. *Journal of Research of the National Bureau of Standards*, v. 48, Jan. 1952, p. 54-58.

An electronic instrument was developed to determine the differential height of the two arms of a mercury manometer. The instrument has a sensitivity corresponding to 0.0005-in. height differential, and the pickup units are designed to provide this performance at absolute pressures up to 35,000 psi. Use is made of a high-frequency, mutual-inductance micrometer, with the tops of the mercury columns serving as the reference surfaces.

5740 Efficiency of a Scintillation Counter With Anthracene Phosphor for High-Energy Gamma-Rays. Ole Lönsjö. *Nature*, v. 169, Mar. 1, 1952, p. 365-366.

The above was investigated. Results are considered reliable within 10%.

5741 A High-Resolution Surface-Profile Microscope. S. Tolansky. *Nature*, v. 169, Mar. 15, 1952, p. 445-446.

Describes improvements made by reversing the illumination, using a bright field crossed by a dark line, instead of a light slit on a dark field.

16. *Apparatus, Methods, and Standards*

5742* Brighter Fluorescent Images With the Coltman Image Tube. Walter S. Lusby. *Non-Destructive Testing*, v. 10, Winter 1951-1952, p. 7-10.

Describes, diagrams, and illustrates above tube developed to achieve brighter images. Comparative results are presented.

5743* Fluorescent Penetrant Inspection of Jet Propulsion Engine Component Parts. W. B. Buckman. *Non-Destructive Testing*, v. 10, Winter 1951-52, p. 11-13.

Discusses the basic steps and principles of above method and its application to above parts.

5744* Testing of Railroad Rails by the Ultrasonic Resonance Method. Peter K. Bloch. *Non-Destructive Testing*, v. 10, Winter 1951-52, p. 16-18.

Describes the ultrasonic resonance method, which lends itself to the design of relatively simple, portable, battery-operated equipment. In addition to testing rail ends at the joint, this equipment is practical for testing rail in other critical locations such as frogs, switches, grade crossings, water pans, tunnels, etc.

5745 Magnetic Particle Inspection of Jet Engine Parts. A. Robinson. *Non-Destructive Testing*, v. 10, Winter 1951-52, p. 19-23.

Discusses the above, showing its value as an aid in design of units and in selection of materials, determining the quality of incoming materials, and investigating new processing methods.

5746 Magnetic Particle Inspection. C. M. Geist. *Non-Destructive Testing*, v. 10, Winter 1951-52, p. 27-28.

Discusses utility of the above for metal-parts inspection by the manufacturer. Special refrence is made to parts welded, highly heat treated, or machined.

5747* Self-Scattering and Self-Absorption of Betas by Moderately Thick Samples. W. E. Nervik and P. C. Stevenson. *Nucleonics*, v. 10, Mar. 1952, p. 18-22.

Correction factors for effect of thickness of β-active samples on couting rate were determined. Results indicate that scattering into the counter predominates at low thickness, and that self-absorption increases with thickness.

5748* How to Get Good Gross Autoradiographs of Large Undecalcified Bones. W. E. Lotz, J. C. Gallimore, and George A. Boyd. *Nucleonics*, v. 10, Mar. 1952, p. 28-31.

Recommended procedures are described and illustrated.

5749* Latest Developments in Scintillation Counting. *Nucleonics*, v. 10, Mar. 1952, p. 32-41.

Presents digest of papers and discussions presented at the Scintillation Counter Symposium held in Washington, D. C., on Jan. 29-30, 1952. Includes tabular and graphical data.

5750 A Symmetrical All-Dielectric Interference Filter. Harry D. Polster. *Journal of the Optical Society of America*, v. 42, Jan. 1952, p. 21-24.

By replacing the silver layers in the conventional interference filter with 7 dielectric layers having alternately high and low indices, it was possible to obtain a filter having an 80% peak transmission and 65A half-width for a first-order transmission band centered at 5200A. Properties of the filter were determined from the theory of the parallel-plate interferometer.

5751 An Improved Positive Print Method for Measuring Integrated Intensities of X-Ray Diffraction Patterns. R. L. Griffith. *Journal of the Optical Society of America*, v. 42, Jan. 1952, p. 31-33.

Describes the above. Includes typical results obtained.

5752 A Constant Intensity Vacuum Spectroscopic Light Source. Po Lee and G. L. Weissler. *Journal of the Optical Society of America*, v. 42, Feb. 1952, p. 80-84.

Describes above which furnishes a constant-intensity-emission line spectrum. Reproducibility is achieved by controlling with an oscilloscope the spark-breakdown potential and the number of breakdowns per cycle of applied high voltage.

5753* Scintillation Counter as Gamma Ray Spectrometer. (In English.) V. O. Eriksen, G. Jenssen, and A. Sunde. *Physica*, v. 18, Feb. 1952, p. 91-100.

Describes above. The linearity between released photons and absorbed energy in NaI(Tl) for γ-rays in the region 0.05-0.5 Mev. is verified. The γ-ray energy of Ru^{103} is 0.52 Mev. Differential-discriminator runs and photographs of pulse distribution on an oscilloscope screen are shown.

5754 Further Calculations of X-Ray Diffusion in an Infinite Medium. L. V. Spencer and Fannie Stinson. *Physical Review*, ser. 2, v. 85, Feb. 15, 1952, p. 662-664.

The problem of x-ray diffusion in an infinite homogeneous medium can be solved numerically by a method of expansion into suitable polynomial systems. Presents further numerical applications of the polynomial method.

5755 Measurement of the I, F, and A Lines of Thorium by a New Method. H. Craig. *Physical Review*, ser. 2, v. 85, Feb. 15, 1952, p. 688.

New method for the measurement of β-ray energies was used with the deposit from radioactive Th. It consists in recording on a photographic plate the line image of a line source.

5756 Some Polystyrene Solid Solutions as Scintillation Counters. Thomas Carlson and W. S. Koski. *Physical Review*, ser. 2, v. 85, Feb. 15, 1952, p. 697.

Scintillation efficiency and special emission of a number of polystyrene solid solutions were investigated. Data are charted and tabulated.

5757* Ultrasonic Flaw Detection. (In Polish.) J. Tabin. *Prace Glownego Instytutu Metalurgii*, v. 3, no. 6, 1951, p. 517-526.

Various methods used in ultrasonic production testing are discussed and principles of operation and of technique described. Includes graphs, diagrams, and micrographs.

5758* Limitations on the Accuracy of Electronic Differential Analyzers. A. B. Machee. *Proceedings of the I.R.E.*, v. 40, Mar. 1952, p. 303-308.

The above were investigated mathematically for the general case of differential equations with constant coefficients. It is found that in certain cases an error of 1% can be introduced by an adder bandwidth 2000 times the highest frequency in the differential-equation solution. 10 ref.

5759* A Coincident-Current Magnetic Memory Cell for the Storgae of Digital Information. William N. Papian. *Proceedings of the I.R.E.*, v. 40, Apr. 1952, p. 475-478.

A small, ring-shaped, ferromagnetic core with properly "rectangular" B-H characteristics may be operated so that its flux polarity reverses only when the correct combination of 2 or 3 magnetizing windings are coincidentally excited. Such cores may then be used as memory devices and assembled into 2- or 3-dimensional memory system with storage-cell selection at the intersection of 2 or 3 space coordinates. Repetitive pulse-pattern testing indicates that only a few core materials are satisfactory.

5760* Automatic Process Controls in the Steel Industry. E. Whitehead. *Research*, v. 5, Mar. 1952, p. 133-139.

Describes types of control being applied in the steel industry, with specific reference to automatic control of gas booster fans, gas producers, and openhearth furnaces. Considerable savings in manpower and maintenance have already been achieved. Extensive research is being carried out in order to develop control systems suitable for some of the many other processes used in steel production.

5761 An Economical High-Temperature Infra-Red Oven. R. B. Belser and J. W. Johnson. *Research Engineer* (Georgia Institute of Technology), Jan. 1952, p. 9-10, 18-19.

The oven described can be made from inexpensive equipment available in nearly every laboratory, yet it is capable of heating to temperatures of 700°C. and of reaching them more rapidly than conventional heating units. If a variable-voltage source is available, the temperature can be controlled very closely.

5762 A Method of Pulse Integration Using the Binary Scaling Unit. F. M. Glass and G. S. Hurst. *Review of Scientific Instruments*, v. 23, Feb. 1952, p. 67-72.

Describes and discusses operation of an automatic pulse inte-

grator. It is used to determine the dose resulting from certain types of ionizing radiation by weighting by their height the pulses produced in a proportional counter. Disadvantages of an alternative method are given. Block and circuit diagrams, tables, and graphs.

5763 Small Angle X-Ray Scattering Technique. K. L. Yudowitch. *Review of Scientific Instruments*, v. 23, Feb. 1952, p. 83-90.

Describes in critical detail the design and operation of apparatus for the above. Concerns primarily the measurement of unoriented materials, using peak analysis and slope analysis. Table, diagrams, and 16 ref.

5764 Low Powered Induction Heater for Laboratory Use. R. L. Shipp. *Review of Scientific Instruments*, v. 23, Feb. 1952, p. 91-92.

Describes the above equipped with fine, continuous control, and capable of delivering 20 watts of power into a load 12 ft. from the heater with fair efficiency. Circuit diagram.

5765 Electron Velocities in Geiger Counter Gas Mixtures. Letter I. Alden Stevenson. *Review of Scientific Instruments*, v. 23, Feb. 1952, p. 93.

Describes a coincidence-counting method for measuring the above. It is useful for selecting gas mixtures for use in Geiger counters with short delay times. An example of the latter is given. Schematic diagram.

5766 General Observations on Discharge Lag in Counters. Letter IV. W. E. Ramsey. *Review of Scientific Instruments*, v. 23, Feb. 1952, p. 95.

5767 Coincidence Time Delays in Geiger Counters. Letter II. Alden Stevenson. *Review of Scientific Instruments*, v. 23, Feb. 1952, p. 93-94.

Describes an experiment giving information, in relation to the above, on the distribution of time delays from 2 counters. Data indicate that maximum coincidence delay time could be reduced to 10^{-8} sec.

5768 Short Double Coincidence Resolving Times for G-M Tubes. Letter III. C. E. Mandeville. *Review of Scientific Instruments*, v. 23, Feb. 1952, p. 94.

Presents data to emphasize that very short coincidence resolving times may be used with no coincidence loss, in connection with coincidence G-M tubes. Resolving times of 10^{-7} sec. are easily obtainable with argon-ether tubes 1.5 cm. in diam.

5769 Delay Times in G-M Counters. Letter V. W. C. Porter and W. E. Ramsey. *Review of Scientific Instruments*, v. 23, Feb. 1952, p. 95-96.

Shows that G-M counters, 7 mm. diam., can have a maximum delay time which is no greater than $4x10^{-8}$ sec. Graph.

5770 Intensification of X-Ray Diffraction Films to Increase Speed. G. M. Corney and H. R. Splettstosser. *Review of Scientific Instruments*, v. 23, Feb. 1952, p. 98-99.

Gives process for the above, including formulas. Speed increases of up to 4 times are obtainable.

5771 Cylindrical Light Scattering Cell. L. P. Witnauer and H. J. Scherr. *Review of Scientific Instruments*, v. 23, Feb. 1952, p. 99-100.

Describes construction and performance of the above for making measurements of high molecular weights. Useful for angles as low as 22° to the incident beam. Graphs and apparatus diagram.

5772* Sampling of Lump-Form Solid Materials by a Random Method. (In French.) A. Palazzi. *Revue de Métallurgie*, v. 49, Jan. 1952, p. 22-34; disc., p. 34.

Discusses sampling for chemical analyses and for other tests; calculation of the weight of the sample, reduction of the sample, determining the diameter of the pieces, accuracy of results, and sampling on an experimental basis. Includes charts, diagrams, and tables.

5773* Holland Standardizers. Part I. F. van Teutem. *Standardization*, v. 23, Mar. 1952, p. 68-74, 92.

An illustrated review of important industrial organizations in Holland and their experiences with standardization. (To be continued.)

5774* Merry Go Round for Molecules. Morton M. Hunt. *Steelways*, v. 8, Mar. 1952, p. 10-11.

Describes and illustrates ultracentrifuge machine which creates a force of 500 g. Research applications are outlined.

5775* A Hand for Tomorrow. J. George Frederick. *Steelways*, v. 8, Mar. 1952, p. 23.

Describes mechanical hand powerful enough to lift a 1000-lb. motor; deft enough to take that same motor apart, or lift a delicate test tube. Six reversible electric motors supply the "muscle" for each movement, and all basic movements are controlled by an operator holding a pistol-grip handle. Designed for operation in atomic hot spots.

5776* A High-Speed Recording Yarn Tensiometer. F. Nistico, B. S. Sprague, and R. W. Work. *Textile Research Journal*, v. 22, Feb. 1952, p. 99-110.

A yarn tensiometer is described which is capable of detecting and recording variations in tension occurring at a rate of the order of 100 cycles per sec. Tension variations of a considerable magnitude at such frequencies have been shown to exist in yarn running on standard textile machinery.

5777* Continuous Ultramicroscopic Method of Dispersion Analysis of Aerosols and Hydrosols. B. V. Deriagin and G. Ia. Vlasenko. *Vestnik Akademii Nauk SSSR*, v. 21, May 1951, p. 76-78.

Above method of analyzing smokes and colloidal suspensions is briefly described and discussed.

5778 Symposium on Industrial Radiology. An Analysis of Radiographic Image Quality. D. Bromley. **The Present State of Non-Destructive Testing of Materials in Germany.** R. Berthold. *Welding and Metal Fabrication*, v. 20, Mar. 1952, p. 110-112.

Deals with radiographic inspection of welds and the quality of radiographs. (To be continued.)

5779* New Graphical Methods for Analysis and Design; "Straight-Line" Representation of Filter Characteristics. W. Saraga and L. Fosgate. *Wireless Engineer*, v. 29, Mar. 1952, p. 68-79.

The concept of graphical straight-line methods for the solution of network problems is introduced. Application of such methods to the analysis and design of image-parameter and insertion-parameter filters is described in some detail. 11 ref.

5780* Brief Note on a Piezoelectric Vibration Galvanometer. (In German.) Hansgeorg Laporte. *Zeitschrift für angewandte Physik*, v. 4, Jan. 1952, p. 16-17.

Sensitivity of a high-load galvanometer is attained by means of a 3-step amplifier. Diagrams illustrate the arrangement.

5781* An Electrostatic Differential Manometer With a Sensitivity of $2x10^{-6}$ Mm. Hg/Sec. (In German.) E. W. Becker and O. Stehl. *Zeitschrift für angewandte Physik*, v. 4, Jan. 1952, p. 20-22.

Describes design and operation of above manometer. Diagrams and graphs.

5782* Measuring Temperature by the Line-Reversal Method for Short-Time Aperiodic Processes. (In German.) Fritz Rössler. *Zeitschrift für angewandte Physik*, v. 4, Jan. 1952, p. 22-29.

Describes principles, arrangements, and application of above method. Procedure of computing temperature and degree of accuracy is discussed; and a practical example of applying the method is presented. Includes diagrams, photographs, graphs, and tables. 13 ref.

5783* Effect of a Diffusion Layer on the Electrochemical Determination of Oxygen and Oxide Coatings on Metals. (In German.) F. Todt, S. Kahan, and W. Schwarz. *Zeitschrift für Elektrochemie Berichte der Bunsengesellschaft für Physikalische Chemie*, v. 56, Jan. 1952, p. 19-23.

Shows that current density is proportional to oxygen concentration within wide range in accordance with Fick's first law of diffusion. The gradual drop in current density as result of

16. *Apparatus, Methods, and Standards*

formation of a diffusion layer is shown to agree with theory. Data are graphed and tabulated. 12 ref.

Miscellaneous Publications

5784* Bibliography of Differential Thermal Analysis. W. J. Smothers, Yao Chiang, and Allan Wilson. University of Arkansas, Institute of Science and Technology. Research Series 21, Nov. 1951, 44 pages. (Z7144.H4 Sm79b)

Part I presents a brief description and history of the method of differential thermal analysis. Part II is a chronologically arranged bibliography of technical papers in which use of the method of differential thermal analysis was reported. Part III is an index of authors. The last part is an index of materials which have been analyzed by the differential thermal method.

5785 X-Ray Calibration of Radiation Survey Meters, Pocket Chambers, and Dosimeters. Frank H. Day. National Bureau of Standards, Circular 507, July 25, 1951, 11 pages. (T21 Un3c)

Responses of instruments of ionization-chamber and Geiger-Müller counter types to measured exposures or intensities were studied for radiations generated by applied X-ray tube potentials ranging from 30 to 1200 kilovolts. Results of these studies indicate that instruments of a given type constructed by different manufacturers behave similarly in the above range. However, marked discrepancies occur among instruments of the same type constructed by different manufacturers for radiations generated by potentials lower than 250 kilovolts. These discrepancies are related to the atomic numbers of the wall materials that envelop the sensitive volumes of the instruments.

5786 Methods of Measuring Humidity and Testing Hygrometers; A Review and Bibliography. Arnold Wexler and W. G. Brombacher. National Bureau of Standards, Circular 512, Sept. 28, 1951, 18 pages. (T21 Un3c)

157 references.

Books

5787 Modern Pyrometry. Charles H. Campbell. 150 pages. 1951. Chemical Publishing Co., New York. (QC277 C15m)

Discusses new techniques and equipment used in the above. Includes types and uses of thermocouples, lead wire, and protection tubes; temperature indicators, recorders, and controllers; and applications, care, and maintenance of pyrometers.

5787a The Photographic Study of Rapid Events. W. Deryck Chesterman. 167 pages. 1951. Clarendon Press, Oxford, England. (TR893 C42p)

Deals with the various techniques which may be employed; and discusses the conditions of speed, lighting, repetition, and sensitivity which influences their choice. Includes 32 plates showing specific examples. Chapter references.

5788 Practical Electron Microscopy. V. E. Cosslett. 299 pages. 1951. Academic Press, New York. (QH211 C82p)

Presents an introduction to the basic physical features and to the functioning and operation of the several parts of the above instrument. Illustrations and diagrams. 290 ref.

5789 Fundamentals of Automatic Control. G. H. Farrington. 285 pages. 1951. Chapman & Hall, Ltd., London. (TA165 F24f)

Intended for those who are interested in any of the applications of automatic control. It comprises a general survey of the field which such applications may involve and undertakes an investigation of the basic nature of the problems which may be encountered. Deals with the underlying principles which affect automatic control performance, rather than with specific details of plant or apparatus.

5790 Magnetic and Electrical Methods of Non-Destructive Testing. D. M. Lewis. 242 pages. 1951. George Allen & Unwin, Ltd., London. (TA410 L58m)

The above is intended as a work of reference for the technicians in ferrous and nonferrous metal making and working industries. Includes numerous graphs, diagrams, and illustrations.

5791 Electronic Applications. Henry A. Miller. 110 pages. 1951. E. & F. N. Spon, Ltd., London. (TK7880 M61e)

Describes, with the help of diagrams and photographs, a wide range of present applications. Written for the use of engineers and technicians concerned, or interested in, modern scientific and industrial development. Chapters are as follows: Electron Tubes, Electronic Motor Control, Regulating and Counting, Detecting and Testing, Electronic Temperature Control, Photo-Electric Control, Radio, Radio Control, Radar, and Television, Electronics in Medicine, and Miscellaneous Applications of Electron Tubes.

5792 Handbook of Scientific Instruments and Apparatus, 1951. 244 pages. 1951. Physical Society, London. (Q185 P56h)

Briefly describes and illustrates commercially available instruments and apparatus shown at the 35th Physical Society Exhibition held Apr. 6-11, 1951, in London.

5793 Industrial Uses of Radioactive Fission Products. 102 pages. Sept. 1951. Stanford Research Institute, Stanford, Calif. (QC782 St24i)

On the basis of a field survey and correspondence, Stanford Research Institute has evaluated preliminary suggestions for specific uses of fission products showing industrial promise. The evaluations are based upon knowledge of work already accomplished in particular fields with other forms of radioactivity, experience reported by companies visited, and application of accepted techniques of market and technical analysis. Sections are as follows: Introduction; Conclusions; Technical and Engineering Considerations; Marketing Considerations; Cold Sterilization of Drugs, Medical Supplies and Foods; Activation of Chemical Reactions; Phosphor Activation, Static Elimination, and Miscellaneous Uses; Penetration and Detectability of Radiation; Economic Considerations; and Fission Product Research Program. Includes 4-page bibliography.

5794 Les Isotopes Radioactifs en Médecine et en Biologie. (Radioactive Isotopes in Medicine and Biology.) Tubiana. 391 pages. 1950. Masson et Cie., Paris. (QH652 T79i)

Describes the latest progress of biological and medical uses of radioelements. Contains a complete report of techniques for detecting and measuring radioactivity, and on the use of radioisotopes as indicators in biology and medicine and as therapeutic agents. Discusses safeguards necessary during the use of radioactive isotopes.

5795 Ionization Chambers and Counters. D. H. Wilkinson. 266 pages. 1950. Cambridge University Press, London and New York. (QC721 W65i)

Describes the classic instruments of detection used in nuclear physics; factors such as specific ionization, range-energy relations, W-value, straggling in range and ionization yield, heavy-ion and electron mobility, diffusion of ions, and electron capture. The first Townsend coefficient and recombination are discussed, together with the shapes of the pulses from the various detectors and the effect of "differentiation." Gridded and thin-wire chambers are discussed in some detail. The 3 types of detector are then treated in separate chapters. 5-page bibliography.

5796 Proceedings of a Second Symposium on Large-Scale Digital Calculating Machinery. 393 pages. 1951. Harvard University Press, Cambridge, Mass. (QA75 Sy68p2)

Talks, papers, and discussions presented at symposium jointly sponsored by U. S. Navy Dept. Bureau of Ordnance and Harvard University, at the latter's Computation Laboratory, Sept. 13-16, 1949.

5797 Servomechanisms. 293 pages. 1951. His Majesty's Stationery Office, London. (Selected Government Research Reports, v. 5.) (TJ213 G79s)

Consists of 17 separate reports by various authors on different aspects of above subject.

5798 Synthesis of Electronic Computing and Control Circuits. 278 pages. 1951. Harvard University Press, Cambridge, Mass. (QA75 H26s)

Presents a systematic and practical approach to the design of the above, prepared by the staff of the Computation Labora-

tory. Design of digital computing machinery receives special emphasis, but the techniques described are general in their application.

See also:
5158 (applications of vacuum in metallurgy)
5202 (hard metals—quality control in production)
5231 (inspection of welded pressure vessels)
5256 (welding specifications)
5407 (thermal conducticity apparatus)
5416 (cleaning of mercury)
5804 (lead vessels for radiation protection)
5805 (specifications for hot-metal ladles)
5817 (specifications of dental materials)
6050 (evaluation of centrifuge performance)
6497 (measurement of ultrasonic attenuation)
6573 (physics of thin layers—German book)
6591 (sources of electrical wire standards)
6601 (d.c. amplifier for analog computer)
6620 (d.c. synchronous motors for industrial control)
6624 (electronic recording of high-speed transients)
6664 (Fourier treatment of optical processes)

17. METALS—FABRICATION AND USES

5799* Stratospheric Flight and Metallurgy. *Aeroplane*, v. 82, Mar. 21, 1952, p. 334-335. (Based on lecture by P. L. Teed.)

Brief discussion of some special problems on the above, including wear of commutator parts and various effects on corrosion and mechanical properties. Unusual effects on miscellaneous ferrous and nonferrous metals are mentioned.

5800 Recommendation for Design and Operation of Molybdenum-Wound Hydrogen Atmosphere Furnaces. W. P. Keith. *American Ceramic Society Bulletin*, Mar. 1952, p. 76-78.

Discusses the use of Mo as winding on furnace tubes. Temperature-resistivity characteristics of Mo are given. Refractory requirements for this type of furnace are also discussed.

5801* Equipment for Use With High-Strength Hydrogen Peroxide. Noah S. Davis, Jr., and John H. Keefe, Jr. *Journal of the American Rocket Society*, v. 22, Mar.-Apr. 1952, p. 63-69.

Results of compatibility tests on various materials, including metals, plastics, and lubricants, are presented. General equipment-design considerations and methods of preparing the equipment for H_2O_2 service are outlined. Examples of the following equipment are presented and discussed: pumps, containers, piping, flexible hose, valves, and reactors.

5802 Skyscrapers Clad in Metal Coats. *Business Week*, Mar. 29, 1952, p. 72-74, 77.

Describes and illustrates 4 Pittsburgh office buildings in the final stages of construction. Three are clad in stainless steel, one in aluminum. Primary advantages are weight and space saving and ease of maintenance.

5803 Basic Structural Design for Transmission Substations Including Light Metals. *Electrical Engineering*, v. 7, Apr. 1952, p. 344-350. (To be published in *AIEE Transactions*, v. 71, 1952.)

A classification of structures for transmission substations is given, with recommendations for choosing suitable materials and designs. Steel, aluminum, wood, and concrete are considered. Methods of determining design loadings are discussed, together with industry practices regarding design and fabrication standards. 22 ref.

5803a The Role of Castings in Mechanical Engineering Design. W. Hartmann. *Engineers' Digest*, v. 13, Mar. 1952, p. 83-86. (Translated and condensed from *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, Jan. 21, 1952, p. 65-73.)

Previously abstracted from original.

5804 Lead Vessels in Radioactive Work. C. Fisher. *Industrial Chemist and Chemical Manufacturer*, v. 28, Mar. 1952, p. 120-124.

Describes the various types of equipment which have been designed to afford protection from harmful radiation.

5805 Specifications for Design of Hot Metal Ladles. *Iron and Steel Engineer*, v. 29, Mar. 1952, p. LS1-LS13.

Reproduces AISE Standard No. 9, (Tentative), Sept. 30, 1951. Simplified design and analysis procedures for opentop hot-metal ladles are presented and results compared with laboratory tests and actual design practice.

5806 Gas Turbine Engine Materials. R. H. Thielemann, J. C. Mertz, and W. P. Eddy, Jr. *Machine Design*, v. 24, Mar. 1952, p. 216, 218, 220, 223, 225. (A condensation.)

Discusses various materials which can be substituted for stainless alloys in high-temperature service. Need for better materials is emphasized.

5807 Aluminium As a Shipbuilding Material. E. C. B. Corlett. *Metal Industry*, v. 80, Feb. 29, 1952, p. 163-167. (A condensation.)

Discusses materials and their present status, methods available for joining them, and future trends.

5808* Possibilities of Application for Cast Aluminum, Particularly in Automobile Construction. Curt Bucken. (In German.) *Metall*, v. 6, Mar. 1952, p. 123-128.

Reviews a number of applications not usually considered in the German aluminum industry. Details of casting, welding, and surface treatment are indicated. Data are tabulated. Photographs illustrate the article.

5809* Utilization of Tungsten. (In French.) *Métallurgie et la Construction mécanique*, v. 83, Jan. 1952, p. 25-27, 29; Mar. 1952, p. 159, 161-162.

Discusses ferrotungsten and its production. Describes effects of tungsten in carbon and alloy steel. Gives detailed figures on percentage compositions of tungsten in steels recommended for various purposes. Includes tables and graphs.

5810* Plastic and Metal Shaping Operations Affect Tube Socket Design. Floyd McKnight. *Modern Industrial Press*, v. 14, Mar. 1952, p. 26, 28, 32.

Describes the application of a plastic, "Kel-F," and silver-plated beryllium copper and phosphor bronze in the production of a socket for a transmitter tube.

5811* Copper Alloys In the Manufacture of Unfinished Watch Movements. (In French and German.) Philippe De Coulon. *Pro-Metal*, v. 4, Dec. 1951, p. 917-918.

Discusses various processes necessary for the manufacture of so-called "blank" movements. Emphasizes the role of certain Cu alloys, usually 60% Cu, 38% Zn, and 1.5-2% Pb.

5812* Problems of Watch Manufacturing. (In French and German.) Andre Chappuis. *Pro-Metal*, v. 4, Dec. 1951, p. 919-921.

Discusses in particular the problems presented by correct choice of alloys for watch springs. Indicates properties of various alloys used for this purpose.

5813* Copper Alloys in the Watch Industry. (In French and German.) *Pro-Metal*, v. 4, Dec. 1951, p. 928-933.

Describes above alloys used in the industry and their properties. Data are charted.

5814 Decontrolled Stainless: A Solution to Shortages. *Steel*, v. 130, Mar. 24, 1952, p. 72-74.

In view of the above, lists various straight-Cr grades giving pertinent data, such as composition, wear, and corrosion resistance, machinability, applications, and price.

5815 Selection and Treatment of Die Steels. Part I. Stewart G. Fletcher. *Tool Engineer*, v. 28, Apr. 1952, p. 41-44.

Discusses classification of die steels and various heat treatments. Tabular data on mechanical properties. (To be continued.)

5816* Newly Developed Bronze Alloys Feature Anti-Galling and Corrosion Resistance. John P. Meyer. *Western Metals*, v. 10, Mar. 1952, p. 35-36.

Describes two new types of the above developed by Olds Alloys, Los Angeles; a white bronze of the Cr-Ni-Mo type; and a Ni bronze of unusually high Pb content. Properties and applications are discussed.

17. *Metals—Fabrication and Uses*

Miscellaneous Publications

5817 Research on Dental Materials at the National Bureau of Standards; A Review and Bibliography. I. C. Schoonover and Wilmer Souder. National Bureau of Standards, Circular 497, Aug. 15, 1950, 14 pages. (TN21 Un3c)

Covers physical and chemical properties and specifications of metallic and nonmetallic dental materials.

Books

5818 Stainless Iron and Steel. Vol. I. Stainless Steels in Industry. Ed. 3. J. H. G. Monypenny. 523 pages. 1951. Chapman & Hall, London. (TN757.C5 M76s3)

The subject is discussed from the point of view of the industrial user. The varieties of stainless steels in commercial use, their compositions, characteristic features, and properties of particular importance to the engineer and metal worker, are described in the first chapter. Subsequent chapters are devoted to methods for fabrication of the steels into useful equipment, and their response to corrosive attack and temperature. In the final chapter, consideration is given to factors affecting selection of suitable forms of stainless steel for specific industries.

5819 Aluminium in the Chemical and Food Industries. 149 pages. 1951. British Aluminium Co., Ltd., London. (TN775 B77a)

Surveys in a general way, the mechanical properties, fabrication methods, joining methods, and surface treatments of Al and its alloys. Effects of various organic and inorganic substances on Al are discussed. Data are graphed and tabulated. 3-page bibliography.

See also:
5169 (low-alloy steel plates)
5203 (metal-powder parts in business machines)
5228 (Ti in silver-solder containers)
5500 (brass escapement levers for watches)
5506 (metallic lubricants)
5544 (Mg-anode performance)
5904 (Cu, Al, and steel in Ford engines)

18. POLLUTION AND WASTES

5820* Fume And Dust Extraction at the Knock-Out. L. W. Bolton. *British Cast Iron Research Association Journal of Research and Development*, v. 4, Feb. 1952, p. 238-242; disc., p. 242-248.

Describes side-suction ventilating equipment successfully adopted in a fully mechanized foundry.

5821 Stacks for Pollution Control. II. R. S. Steinbock. *Chemical Engineering*, v. 59, Mar. 1952, p. 144-147.

Discusses the factor of plume rise in stack-height calculation. A method of calculating this factor is given.

5822 How One Manufacturer Handles Lead Oxide Dust. *Canadian Chemical Processing*, v. 36, Mar. 1952, p. 84.

Brief account of above for the Willard Storage Battery Company (Canada) which uses carefully designed hoods leading to dust collectors.

5823* A Simple Comparison of Dry and Wet Collection Equipment for Airborne Contaminants. Leslie Silverman. *Heating and Ventilating*, v. 49, Apr. 1952, p. 109.

Compares major advantages and disadvantages of dry and wet collection equipment for airborne contaminants. It is intended to be helpful when one has to make a selection or evaluation of such equipment.

5824 Regeneration of Sulphuric Acid in Waste Pickle Liquors. E. W. Mulcahy. *Industrial Chemist and Chemical Manufacturer*, v. 28, Mar. 1952, p. 125-129.

Describes methods employed in the metallurgical industry for the above. Emphasizes ferrous and copper plant wastes.

5825 Liquid Industrial Wastes. *Industrial and Engineering Chemistry*, v. 44, Mar. 1952, p. 467-552.

A symposium on the above consists of the following papers: "Antibiotics", J. M. Brown and J. G. Niedercorn; "Atomic Energy Industry", J. H. Hayner; "Citrus Fruits Industry", Harry W. von Loesecke; "Corn Products Manufacture", Eric M. Van Patten and George H. McIntosh; "Dairy Industry", H. G. Harding; "Grain Distilleries", C. S. Boruff; "Organic Chemicals Manufacture", R. W. Hess and C. J. Carney; "Packinghouses", F. W. Mohlman and K. V. Hill; "Petroleum Refineries", N. J. Gothard and J. A. Fowler; "Pulp and Paper Industry", Harold R. Murdock; "Steel Industry", Richard D. Hoak; "Tanneries", John W. Harnly; "Waste Disposal in Britain", B. A. Southgate; "Removal of Color in Wastes", Willem Rudolfs and W. D. Hanlon; "Brass and Copper Industry", F. X. McGarvey, R. E. Tenhoor, and R. P. Nevers; "Sulfuric Acid Recovery From Waste Liquors", F. J. Bartholomew; "Wastes Containing Radioactive Isotopes", C. C. Ruchoft, A. E. Gorman, and C. W. Christenson; "Mechanism of Methane Fermentation", A. M. Buswell and H. F. Mueller.

5826 Steel Industry. Richard D. Hoak. *Industrial and Engineering Chemistry*, v. 44, Mar. 1952, p. 513-520.

Presents an outline of waste disposal and utilization practices in the steel industry. 25 ref.

5827 Brass and Copper Industry. F. X. McGarvey, R. E. Tenhoor, and R. P. Nevers. *Industrial and Engineering Chemistry*, v. 44, Mar. 1952, p. 534-541.

Recent studies on typical mill rinses have shown that cation exchangers operating in the sodium or hydrogen cycle might be employed successfully to concentrate Cu, Zn, and Cr solutions. The economics of the exchange in the hydrogen cycle indicate that profitable recovery of Cu might be accomplished in conjunction with an electrodeposition process in the Cu pickle itself. Flow rate and influent concentration have a marked effect on the economics of the process. Tables and graphs. 15 ref.

5828 Sulfuric Acid Recovery From Waste Liquors. F. J. Bartholomew. *Industrial and Engineering Chemistry*, v. 44, Mar. 1952, p. 541-545.

A practical method is described for recovering H_2SO_4 from steel mill and titanium-pigment-plant solutions by concentrating the free acid, removing the iron sulfate by salting out, and then decomposing the sulfate for recovery of its acid values. A new method of supplying heat to concentrate the liquors improves fuel efficiency and makes the recovery possibilities somewhat more attractive. The economic aspects of these problems are stressed.

5829 High Purity Spongelike Copper From Waste Pickling Sludge. Robert L. Rusher and George W. Blum. *Industrial and Engineering Chemistry*, v. 44, Mar. 1952, p. 660-664.

The above was prepared from the brass and Cu products industry. The material shows evidence of possessing extremely large surface and high chemical activity. Photomicrographs. 14 ref.

5830 Industrial Wastes. Harold R. Murdock. *Industrial and Engineering Chemistry*, v. 44, Mar. 1952, p. 105A-106A, 108A.

Surveys treating methods available for reducing cyanide waste solutions to harmless waste waters for disposal in streams.

5831 Atmospheric Pollution. Louis C. McCabe. *Industrial and Engineering Chemistry*, v. 44, Mar. 1952, p. 113A-114A, 116A.

A review of the literature indicates that significant quantities of germanium, important in electronics, may be obtained from coal and/or ash. 12 ref.

5832* Utilisation of Sulphite Waste Liquors. *International Chemical Engineering & Process Industries*, v. 33, Mar. 1952, p. 131-133.

Discusses the various chemicals and chemical products which can be recovered from the waste liquors produced during the production of paper pulp by the sulfite process.

5833 Effect of CaO:MgO Ratio in the Neutralization of Pickle Liquor. Francis J. Clauss and Lloyd E. Brownell. *Iron and Steel Engineer*, v. 29, Mar. 1952, p. 63-70.

A study of the above in relation to filtering characteristics. A CaO:MgO ratio of about 96:4 gives best rates of filtration for neutralized slurry. Presents graphically the relationships between volume of filter cake, filtration rates, lime composition, and operating-pressure drop during filtration.

5834* Large-Scale Filtration and Purification of Air Supplies (With Special Reference to the Electrostatic Precipitator). D. L. Munden. *Journal of Applied Chemistry*, v. 2, Feb. 1952, p. 65-68.

Describes construction and principles of operation of the Precipitron and miniature Cottrell-type electrostatic precipitators. Measurements were made of the efficiency of these two types of precipitator in removing chemical dust from the air. Details are given of the experimental method and efficiency values compared with those obtained for a number of commercial dust filters under similar conditions.

5835* Liquid Particles in Atmospheric Haze. Sylvan Rubin. *Journal of Atmospheric and Terrestrial Physics*, v. 2, no. 2, 1952, p. 130-140.

Relatively dense air-pollution haze was sampled by modifications of the jet impactor and the electrostatic precipitator. Observation indicates that visible pollution consists mainly of stable liquid aerosal particles. These droplets seem similar in composition to the smaller condensation nuclei commonly found in industrial urban atmospheres. 11 ref.

5836* Destructive Catalytic Oxidation of Aqueous Waste Materials. Ralph V. Green and D. V. Moses. *Sewage and Industrial Wastes*, v. 24, Mar. 1952, p. 288-299.

Covers the laboratory scouting, semi-works-scale tests, proposed full-scale installation, and, briefly, some comparative economics of the vapor-phase process, with respect to dilute solutions of organic wastes entering the river from the Belle, W. Va., plant of DuPont.

5837* Assimilation of Dairy Wastes by Activated Sludge. II. The Equation of Synthesis and Rate of Oxygen Utilization. Sam R. Hoover and Nandor Porges. *Sewage and Industrial Wastes*, v. 24, Mar. 1952, p. 306-312.

5838* Portable Apparatus for Determing the Concentration of Coal Dust. (In Russian.) F. M. Galadzhii. *Ugol*, v. 26, July 1951, p. 31-32.

A portable dust meter was developed. Its construction and use are described and illustrated.

Miscellaneous Publications

5839 Control of Air and Stream Pollution by Recovery of Fine Coal and Sulfur. Louis C. McCabe. *Proceedings of the Illinois Mining Institute*, v. 59, 1951, p. 60-64. (TN1 I6p)

Discusses above process as applied to coal-mine wastes.

Books

5840 Proceedings, Smoke Prevention Association of America, Inc. 122 pages. 1950. The Association, Pittsburgh. (TD884 Sm75p)

Consists of 24 papers or talks on various economic and technical aspects of smoke prevention and air-pollution control.

5841 Chlorination of Sewage and Industrial Wastes. 84 pages. 1950. Board of Control, Federation of Sewage and Industrial Wastes Associations, Champaign, Ill. (TD745 F31i)

Reviews chlorination practice in the treatment and disposal of wastes from the earliest known applications. No attempt is made to evaluate chlorination in comparison with other methods of treatment. 13-page bibliography.

See also:
5060 (coal sludge recovery)
5132 (foundry dust arresters)
5614 (study of microparticles in atmosphere)
5615 (cyanide determination in waste water)
6041 (sulfur recovery from smelter gases)
6061 (iron oxide recovery from wastes)
6065 (petroleum-acid-sludge utilization and disposal)
6220 (aerosol formation)
6418 (effect of gaseous air pollution on plants)

19. FUEL TECHNOLOGY

5842* Volumetric Oxidation of Coal. (In Russian.) V. F. Oreshko. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 1, 1952, p. 135-138.

The energies of oxidation for various sized particles of coal were determined. Equations are presented which permit calculation of oxidation rates under storage conditions. Data are tabulated and charted. 13 ref.

5843* Clarain and Durain of Greta Coal. A. B. Edwards and Beryl M. Langham. *Australasian Institute of Mining and Metallurgy, Proceedings*, new ser., Mar. 31-June 30, 1947, p. 38-45.

Presents results of a chemical study of the petrographic components of Greta (Maitland) coal, carried out by the Metropolitan Gas Co., Melbourne.

5844* Some Observations on the Blending of Coals for Metallurgical Coke. Frank H. Reed, H. W. Jackman, O. W. Reese, and P. W. Henline. *Blast Furnace and Steel Plant*, v. 40, Mar. 1952, p. 305-311, 344.

Describes experimental work of the Illinois State Geological Survey on use of Illinois coals in blends with eastern coals. A pilot-plant coke oven, in operation since Jan. 1944, has given results found to be an excellent guide in predicting plant operation. Discusses use of the Dieseler plastometer in study of plastic properties of the coals and their blends. Discusses effects of use of Illinois coal on production cost of coke. Data are charted and tabulated.

5845 The Oxidation, Decomposition, Ignition, and Detonation of Fuel Vapors and Gases. XIX. Optimum Timing of Compression or Spark Ignition as Determined by Adjustment of Compression Ratio; Acetaldehyde and Diethyl Ether as Engine Fuels. R. O. King, E. J. Durand, A. B. Allan, and E. J. T. Hansen. **XX. The Adverse Effect on Thermal Efficiency of the Endothermic Reaction Required for Nuclear Ignition as Shown by Engine Experiments With Methanol, Acetaldehyde, and Diethyl Ether.** R. O. King and A. B. Allan. *Canadian Journal of Technology*, v. 30, Feb.-Mar., 1952, p. 29-60.

29 references.

5846* Progress in Coal Technology. Gasification and Chemical Utilization. W. A. Lang. *Canadian Mining and Metallurgical Bulletin*, v. 45, Mar. 1952, p. 148-152; *Transactions of the Canadian Institute of Mining and Metallurgy*, v. 55, 1952, p. 118-122.

Briefly reviews the above. Covers fixed-fuel and fluidized-bed processes; and synthetic liquid fuels and chemicals from coal. 31 ref.

5847 Underground Coal Gasification. M. L. Kastens. *Chemical Engineering News*, v. 30, Mar. 24, 1952, p. 1194-1198.

Describes and discusses current and proposed methods for the above. Includes experiments in Russia, Europe, Great Britain, and the U. S.

5848* Some Information Concerning the Winkler Patents and Their Influence on the Former German Patent Office. (In German.) *Chemie-Ingenieur-Technik*, v. 24, Feb. 1952, p. 92.

Texts of the German and American patent specifications for the Winkler process for coal gasification are discussed, an essential point being that the gasification takes place in a moving bed.

5849* The Winkler Fluidization Technique. (In German.) Franz Sabel. *Chemie-Ingenieur-Technik*, v. 24, Feb. 1952, p. 93-97.

Describes and diagrams equipment and procedure. Typical data are charted and discussed. 16 ref.

5850* Reactivity of Coke Impregnated With Solutions of Certain Salts. (In French.) P. P. Kozakevitch, L. A. Wixwo, and A. F. Kononenko. *Circulaire d'Informations Techniques*, v. 9, Feb. 1952, p. 191-208. (Translated from *Zhurnal Obshchei Khimii*, v. 3, no. 7, 1933, p. 808-818.)

Presents a systematic study of the influence on the reactivity of coke of small quantities of metal (0.05-0.5%) in the form of salt solutions. Discusses precipitation of hydroxides by NH_3 in the pores of coke; reactivity of impregnated coke without preliminary precipitation; influence of additions of Al, Ca, Mn, Fe, and Cu salts; FeS_2 precipitated by $(NH_4)_2S$; and influence of these additions on reactivity at 900°C. of pure coke from the carbonization of sugar and from 3 kinds of industrial coke, with and without preliminary acid extraction of minerals. Includes tables and graphs. 23 ref.

19. *Fuel Technology*

5851* Technique of the Use of X-Rays in the Study of Coking. (In French.) André-Antoine Peytavy and Jean Lahouste. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Feb. 25, 1952, p. 934-935.

Discusses a method for examining by X-rays a mass of coal during coking, which makes possible interesting observations on the phenomena of carbonization; as well as precise measurements on deformation and on width and rate of displacement of the plastic layer. Includes apparatus diagram.

5852* Emergency Gas-Making Methods. A. R. Myhill. *Gas Times*, v. 70, Mar. 7, 1952, p. 325-326, 329-330.

Discusses various unorthodox methods for production of manufactured gas, including gasification of coal, coke, and oils; vaporization of low-boiling hydrocarbons at ordinary temperatures; and use of permanent gases or hydrocarbon gases from cylinders.

5853* Investigation of the Process of Turbulent Burning, Including Calculation of Secondary Reactions. (In Russian.) S. A. Gol'denberg. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, May 1951, p. 657-666.

An investigation was made of the reduction of CO_2 and of the burning of CO in a carbon tube. Data are discussed, treated mathematically, and charted.

5854* Process of Turbulent Heterogeneous Combustion in the High Temperature Region. (In Russian.) S. A. Goldenberg. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, July 1951, p. 1025-1030.

Presents theoretical, mathematical analysis of the above. Includes graphical correlation with data of the author and of other investigators. 12 ref.

5855* The Oxidation of Coals of Various Degrees of Metamorphism. (In Russian.) V. F. Oreshko. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, July 1951, p. 1031-1040.

Coals with various amounts of volatile matter were investigated by burning in streams of O_2 and air. Data are discussed, tabulated, and charted.

5856* Recognition of the Initial Stages of the Oxidation of Coal. (In Russian.) V. S. Veselovskii and G. L. Orleanskaia. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, July 1951, p. 1041-1045.

Determination of the initial stages of the oxidation of various coals was investigated. Equipment and methods are described. Results are discussed, tabulated, and charted.

5857* Potential Methane Content of "PS", PZh", and Brown Coals. (In Russian.) V. V. Khodot. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, July 1951, p. 1085-1097.

A study was made of the CH_4 content of various coals. A nomogram was constructed which predicts this value, based on the volatile content or carbon content, gas pressure in the vein, and porosity of the coal. Equipment is described and illustrated. Data are tabulated and charted.

5858* Study of the Burning of Carbon in Layers. (In Russian.) N. A. Karzhavina. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Aug. 1951, p. 1165-1177.

Laboratory experiments were made on the oxidation of powdered coal and wood. The influence of rate of blast, oxygen concentration, and temperatures were determined. Data are tabulated, charted, and discussed.

5859* Character of the Relationship of the Heating Ability of Fuels and Their Elementary Composition. (In Russian.) G. F. Knorre. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Aug. 1951, p. 1202-1208.

Heating capacity of various natural fuels and of pure hydrocarbons is discussed. Equations are given for calculating this value. Data are charted.

5860* Method for Characteristic Classification of the Properties of Coal. (In Russian.) I. I. Ammosov. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Aug. 1951, p. 1209-1217.

Coals of the same type but having different properties were analyzed on the basis of their yield of heavy liquids. The amount of the various fractions was used as a means of classifying coals. Data are tabulated and charted.

5861 The Explosive Reaction of Carbon Monoxide and Oxygen at the Second Explosion Limit in Quartz Vessels. Alvin S. Gordon. *Journal of Chemical Physics*, v. 20, Feb. 1952, p. 340-341.

Presents tabular and graphical data on the above. Compares results with those of other investigators.

5862 Cyanogen Flames and the Dissociation Energy of N_2. N. Thomas and A. G. Gaydon. *Journal of Chemical Physics*, v. 20, Mar. 1952, p. 369-374.

The behavior of cyanogen flames under a variety of conditions was observed. Because of the relatively high stability of cyanogen, the behavior is considerably different from that of hydrocarbon flames. Because of the high stability of the combustion products, CO and N_2, the flame temperature can reach temperatures above 4800°K. Spectroscopic observations were made of both the reaction zone and of the mantle of completely burned gases. Comparison is made of calculated flame temperatures and observed mantle temperatures. 23 ref.

5863 Spectroscopic Studies of Low Pressure Combustion Flames. S. S. Penner, M. Gilbert, and D. Weber. *Journal of Chemical Physics*, v. 20, Mar. 1952, p. 522-523.

A large metal duct with suitable accessory equipment has been constructed for above investigations. Apparatus is diagrammed; typical results are charted and discussed.

5864* Gasification by the Moving-Burden Technique. J. W. Rayner. *Journal of the Institute of Fuel*, v. 25, Mar. 1952, p. 50-55; disc., p. 56-59.

Disadvantages of the conventional method of making water gas by carbonization of coal to coke and subsequent gasification of the coke with steam are considered. German processes for production of water gas from low-rank coals such as lignites are reviewed. Describes a semi-technical-scale plant of above type installed at Billingham for the gasification of coke dust. Notes are given on the technical aspects, and a flow-sheet is included for a large plant operating on this type of process.

5865* Discussion on "Automatic Control Systems for the Coal Feed of Gas Producers." *Journal of the Institute of Fuel*, v. 25, Mar. 1952, p. 73-76.

Covers the above paper by S. A. Burke and G. A. Sparham, v. 24, Nov. 1951, p. 257-264.

5866 Development of the Disco Process of Low Temperature Carbonization. C. E. Lesher. *Mining Engineering*, v. 4, Mar. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 193, 1952, p. 287-299.

Describes development of above process for production of low-temperature coke from the first attempt at commercial operation by the American Gas and Electric Co. at Philo, Ohio, in the 1920's, to successful operation in 1949 by the Disco Co. Diagrams, tabular data, and illustrations. 14 ref.

5867* Combustion Rate of Methane-Air Mixtures in the Vicinity of Their Ignition Points. (In German.) H. Mache, W. Kozak, and A. Zappe. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 83, Feb. 15, 1952, p. 171-179.

Discusses experiments on combustion rates in relation to fuel-air ratio and external conditions at the lower and upper ignition points. Photographs and tables.

5868 Carbonaceous Deposits From Hydrocarbon Diffusion Flames. J. R. Arthur, P. K. Kapur, and D. H. Napier. *Nature*, v. 169, Mar. 1, 1952, p. 372-373.

Presents observations of the effects of fuel type and mode of combustion on amount and character of the carbonaceous matter deposited from flames of simple gaseous and liquid fuels. Examination of solvent extracts of the carbonaceous matter led to the conclusion that it probably contained intermediates in the process of carbon formation, and was formed form initially simple fuels by a complex process including dehydrogenation and polymerization.

5869 Facts, Not Fiction About Synthetic Liquid Fuels. Paul R. Schultz. *Petroleum Refiner*, v. 31, Mar. 1952, p. 88, 90, 93-94, 96-98.

Criticizes claims of the U. S. Bureau of Mines, Office of Synthetic Liquid Fuels, concerning costs of manufacturing gasoline from coal or oil shale. Presents results of economic and technological study by experts in the petroleum industry.

5870* Oil Production By Heat From Burning Coal Veins. Frederick Squires and Edmund S. Merriam. *Producers Monthly*, v. 16, Mar. 1952, p. 34-36.

Diagrams and describes process for the above. Underground gasification techniques are used to generate pressure which helps force out oil and gas located in overlying strata.

5871* Technical Aspects of Use of Methane in Town Gas. (In Italian.) M. Boselli. *Rivista dei Combustibili*, v. 5, Dec. 1951, p. 665-693.

Three possibilities for the utilization of methane as town gas are discussed at length: adding it to coal gas; conversion into H_2 and CO and adding to coal-gas; and complete replacement of coal gas with CH_4.

5872* Mechanism of Gaseous Detonation. (In Russian.) M. A. Rivin. *Uspekhi Khimii*, v. 20, July-Aug. 1951, p. 473-494.

A detailed discussion of the theory and mechanism of the above. Data are charted. 39 ref.

Books

5873* Atlas für Angewandte Steinkohlenpetrographie. (Atlas for Applied Petrography of Coal.) 329 pages. 1951. Verlag Glückauf G.M.B.H., Essen, Germany. (TN800 At65)

Numerous photomicrographs of coals and coal-bearing minerals with German, English, and French captions. Includes brief descriptive paragraphs in these languages. Also includes graphs and tables.

5874 Proceedings of a Coal Briquetting Conference. 100 pages. 1951. Natural Resources Research Institute, University of Wyoming. (TP327 C63p)

Proceedings of conference held at Superior, Wis., Aug. 2-3, 1951.

See also:
5087 (coal utilization in steelmaking)
5840 (Proceedings, Smoke Prevention Assn.)
5891 (combustion of fuels—book)
5905 (spectroscopic temperature measurement of combustion gases)
6103 (fuels for internal combustion engines)
6577 (ballistic properties of propellants)
6698 (sulfur from coal)

20. HEATING, DRYING, AND AIR CONDITIONING

5875* Theoretical Basis of Heat Production in the High-Frequency and Electric-Arc Furnaces. (In German.) Fritz Walter. *Archiv für das Eisenhüttenwesen*, v. 22, Nov.-Dec. 1951, p. 355-365.

Describes, charts, and diagrams heat production by alternating electromagnetic fields of force, and the influence of a.c. frequency, permeability, and electrical conductivity of the radiator upon energy consumption.

5876 How to Determine Insulation Needed for Furnace Walls. Maurice J. Fish. *Brick & Clay Record*, v. 120, Mar. 1952, p. 85, 88, 90.

Method of computation for determining the insulation required for vertical furnace walls is presented. Formulas for the calculations are developed and explained. (To be continued.)

5877* Heating of Foundries. W. D. Bamford. *British Cast Iron Research Association Journal of Research and Development*, v. 4, Feb. 1952, p. 249-259; disc., p. 260-262.

Outlines factors determing comfort, indicates methods of measuring comfort scales of warmth, and refers to types of thermometers for measuring corrected effective temperature. Types of automatic control of heating installations are considered; relative costs and efficiency of different fuels are tabulated. Concludes with an account of the various types of radiant-heat and convection-heating systems available.

5878* Temperature Distribution With Simultaneous Platen and Dielectric Heating. H. M. Nelson. *British Journal of Applied Physics*, v. 3, Mar. 1952, p. 79-86.

The temperature distribution in a solid of infinite area bounded by 2 parallel planes in which heat is being uniformly generated and the surfaces of which are maintained at an elevated temperature is evaluated for the case in which the solid is initially at a uniform temperature throughout. A comparison is made between platen and combined heating. Some consideration is given to the optimum conditions required for the setting of synthetic resins and like materials for which the setting time is a function of the temperature. Practical considerations which restrict the choice of some of the parameters are mentioned.

5879* Investigation of Ventilation by Means of Radioactive Tracers. (In French.) R. Cadiergues and P. Leveque. *Chaleur & Industrie*, v. 33, Jan. 1952, p. 21-25.

Briefly surveys methods and apparatus for the above. 14 ref.

5880 Ignition Arches—A Proved Accessory for Bituminous Single-Retort Stokers. T. S. Spicer, R. J. Grace, and C. C. Wright. *Combustion*, v. 23, Mar. 1952, p. 49-54.

Presents results of a series of comparative tests on duplicate boilers fired by single-retort underfeed stokers, one having a simple arch over the fuel bed and the other without an arch. The arch was found to permit higher burning rates; it resulted in increased efficiency; and, by eliminating the necessity for frequent attention to the fuel bed, it greatly reduced periodic smoke discharge.

5881* Recent Developments in Dielectric Heating. V. L. Atkins. *Electronic Engineering*, v. 24, Apr. 1952, p. 200-205.

Surveys the above, as applied to nonmetals. Diagrams and graphs.

5882* High Frequency Heating Practice. C. E. Eadon-Clarke. *Electronic Engineering*, v. 24, Apr. 1952, p. 210-212.

Surveys the above. Illustrations.

5883* The Regenerator With a Moving Storage Mass. H. Glaser. *Engineer's Digest*, v. 13, Mar. 1952, p. 73-76. (Translated and condensed from *Forschung auf dem Gebiet des Ingenieurwesens*, v. 17, no. 1, 1951, p. 9-15).

Illustrates a heat exchanger of the pebble-heater type, examines mathematically its temperature distribution, analyzes its calorific efficiency, and compares the storage mass of the new and old regenerator systems. This regenerator is said to combine in all respects the advantages of regenerators and contra-flow recuperators. Graphs.

5884* Theory vs. Practice in Radiant Heating. T. Napier Adlam. *Heating and Ventilating*, v. 49, Apr. 1952, p. 88-91. (To be continued.)

5885* Kiln Performance Charted From Studies of Gas Analysis. Warren H. Weisz. *Rock Products*, v. 55, Mar. 1952, p. 88-91, 113.

Gives, in considerable detail, the correct manner of kiln-performance evaluation by means of gas analysis. Applicable to vertical and rotary kilns, to lime and also cement kilns, and to any fuel including coke, wood, oil, or natural gas.

5886 High Capacity Shaft Kilns. Gordon R. Lacy. *Rock Products*, v. 55, Feb. 1952, p. 117-119.

Describes modernization of small vertical kilns of Dominion Lime, Ltd., Quebec, Canada, converted to induced-draft and center-burner firing. These small, highly efficient and highly productive, automatic Azbe patented kilns may, it is believed, be the forerunner of a new concept of vertical-kiln operation.

5887 Heating in Vacuo by an External Radiation Source. A. Leemans and R. Kompfner. *Vacuum*, v. 1, July 1951, p. 203-204.

A tungsten-filament lamp and an ellipsoidal reflector may be used to heat miscellaneous small objects. Theory is outlined and several applications in electron-tube construction, localized heating, and soldering or brazing are suggested.

20. *Heating, Drying, and Air Conditioning*

Miscellaneous Publications

5888 Investigation of the Pressure Characteristics and Air Distribution in Box-Type Plenums For Air Conditioning Duct Systems. S. F. Gilman, R. J. Martin, and S. Konzo. Engineering Experiment Station, University of Illinois, v. 48, Bulletin Series 393, July 1951, 77 pages. (T1 I6b)

Includes diagrams, illustrations, graphs, and tables.

5889 Performance of a Gas-Fired Forced-Air Heating System in Research Residence No. 1. Seichi Konzo, George H. Green, Robert W. Roose, and Morris E. Childs. Engineering Experiment Station, University of Illinois, v. 49, Bulletin Series 397, Dec. 1951, 48 pages. (T1 I6b)

Describes and diagrams equipment and procedures. Results are charted, tabulated, and discussed.

5890 Metal Temperature in Regenerative and Recuperative Air Preheaters. T. A. Wideil and S. I. Juhasz. *Transactions of the Royal Institute of Technology*, no. 54, 1952, 46 pages. (T4 R81t)

Surveys the troubles in air-preheaters for boilers. Deals with raising the metal temperature as a means of preventing damage to the heater during operation. Compares methods used to date for this purpose. 12 ref.

Books

5891 Heating Design and Practice. Robert Henderson Emerick. 453 pages. 1951. McGraw-Hill, New York. (TH7222 Em32h)

Presents basic theories of heating design with demonstrations of how these theories are worked out, followed in many instances by case histories and evaluations of results. Brings together working information on subjects and problems closely allied to heating design and practice. This category includes combustion of fuels, design of fuel handling and storage systems, and heat insulation and refractories.

See also:
6511 (waste-heat utilization from nuclear pile)

21. PRIME MOVERS

5892* Combustion Studies With a Rocket Motor Having a Full-Length Observation Window. Kurt Berman and Stanley E. Logan. *Journal of the American Rocket Society*, v. 22, Mar.-Apr. 1952, p. 78-85; disc., p. 85, 103.

A 1200-lb.-thrust rocket motor with an observation window was built and used for photograhpic investigation of rocket-motor combustion process. Pictures are presented illustrating the ignition, preliminary, and full-stage sequence of rocket-motor combustion during both stable and unstable operation. The reactants were ethyl alcohol and liquid oxygen.

5893* Photographic Techniques Applied to Combustion Studies—Two-Dimensional Transparent Thrust Chamber. John H. Altseimer. *Journal of the American Rocket Society*, v. 22, Mar.-Apr. 1952, p. 86-91, 103.

A 2-dimensional transparent thrust chamber, approximating a slice, 0.47 in. thick from a 1000-lb. thrust chamber, was used for tests of 5 different injector types. The different combustion patterns and some examples of combustion instability are illustrated. Curves are shown for chamber gas velocities vs. axial distances from the injector faces, and velocities obtained with each injector type are compared.

5894* Interplanetary Travel Between Satellite Orbits. Lyman Spitzer, Jr. *Journal of the American Rocket Society*, v. 22, Mar.-Apr. 1952, p. 92-96.

Analyzes performance expected of a rocket powered by nuclear energy, and utilizing an electrically accelerated ion beam to achieve a gas ejection velocity of 100 km./sec. without use of very high temperatures in the propellant gases. While such a rocket would have much too low a thrust to take off from the surface of a planet, it would appear to be capable of traveling form a circular orbit about the Earth to a circular orbit about any other planet in the solar system. Gases obtained from planetary atmospheres could be used for the propellant, and the only refueling required from the Earth would be supplies for the crew and small amounts of fissionable material. Preliminary indications are that such a rocket could feasibly be constructed and operated at the present time.

5895* Varying Viewpoints on Stroke-Bore Ratio. *Diesel Power and Diesel Transportation*, v. 30, Mar. 1952, p. 46-47, 80. (Reprinted from *Oil Engine and Gas Turbine.*)

Presents some British thinking on above design problem for diesel engines.

5896* The New Worthington DR—A Triple Threat Engine. Volney M. Holmes. *Diesel Power and Diesel Transportation*, v. 30, Mar. 1952, p. 48-52.

This new engine is designed for operation as an oil diesel, dual fuel diesel, or as a high-compression spark-ignition gas engine, with a minimum amount of changeover. Diagrams and illustrations.

5897* The Industrial Gas Turbine. A. Kellersberger. *Engineering Journal*, v. 35, Mar. 1952, p. 188-194.

Reviews development, characteristic qualities, and operational experience with the gas turbine, for power generation and industrial applications. Diagrams, graphs, and illustrations.

5898* New Two-Stroke Cycle Vee-Type Diesel Engines. L. Richter. *Engineers' Digest*, v. 13, Feb. 1952, p. 50-51. (From *Zeitschrift des Osterreichischen Ingenieur- und Architekten-Vereines*, v. 96, Dec. 3, 1951, p. 197-201.)

Sectional drawings are shown of above water-cooled engines. Operation is discussed and operating data given.

5899* Heat Calculations for a Natural-Steam Power Plant. (In Japanese) Katsuro Yamanoto and Kuniyoshi Obata. *Journal of Mechanical Laboratory*, v. 5, Nov. 1951, p. 304-311.

Describes 3 methods for utilizing steam tapped from underground, and discusses their relative merits. Results of calculations are charted and discussed.

5900 Recent Developments in Francis Turbines. Wm. J. Rheingans. *Mechanical Engineering*, v. 74, Mar. 1952, p. 189-196, 211.

Discusses the above, showing that trend in turbine design is toward reduction in over-all weight and cost by use of welded plate-steel construction, and by increasing the casing-inlet velocities. The increased use of stainless steels and Al bronzes to resist pitting corrosion and erosion results in a reduction of maintenance and downtime, as well as other advantages.

5901 Design Features of a 250-KW Gas-Turbine Engine Used as Drive for Shipboard Emergency Generator. R. R. Peterson and P. G. Carlson. *Mechanical Engineering*, v. 74, Mar. 1952, p. 197-201.

Discusses characteristics, performance, arrangement of components, the compressor and combustor fuel and control system, and test program.

5902 Thermal Performance of Modern Turbines. H. R. Reese and J. R. Carlson. *Mechanical Engineering*, v. 74, Mar. 1952, p. 205-211.

Provides data on the heat rates that can be expected from turbine-generator units of 75,000-200,000 kw. capacity operating with the regenerative steam cycle, and with various steam conditions. Similar information is provided for turbine-generator units operating with the combined regenerative and re-superheating cycles. Means are provided for calculating turbine-throttle steam flow at city output, together with the corresponding flow to the condenser and quantity of steam extracted for feed-water-heating purposes.

5903 Turbine Blades, "Sweat Cooled". George Atwell Richardson. *Metal Progress*, v. 61, Mar. 1952, p. 81.

With respect to the problem of cooling jet-engine rotor blade (swept by hot gases), chief features of the above method are described.

5904 A Look at the First Ford Overhead Valve Engine. *SAE Journal*, v. 60, Mar. 1952, p. 25-41. (Based on "The New Ford Six-Cylinder Engine," by E. S. MacPherson.)

Includes illustrations with descriptive captions. Compares new engine with L-head counterpart, analyzes constructural features, shows how engine is lubricated, and gives performance data. Mentions various metals used, i.e. Al pistons, Cu radiator, etc.

5905* Principles on the Spectroscopic Measurement of Temperatures and Velocities of Very Hot and Very Rapidly Flowing Combustion Gases. (In German.) Irene R. A. E. Bredt. *Zeitschrift für Elektrochemie Berichte der Bunsengesellschaft für Physikalische Chemie*, v. 56, Jan. 1952, p. 71-84.

Examines critically the classical method of measuring rocket exhaust gases and shows that the assumption of equilibrium of all degrees of "energy freedom" in the exhaust gases is invalid. Considering characteristic temperatures of translation, rotation, vibration, electron excitation, ionization, etc., an attempt is made to determine deviation from general equilibrium for the different forms of energy. Data are graphed and tabulated. 32 ref.

Miscellaneous Publications

5906* Second Performance Investigation on a Small Engine. (In Japanese.) Mechanical Laboratory (Tokyo, Japan), Report 8, June 1951, 96 pages.

Presents details of design and performance of various small kerosene and diesel engines made in Japan for the export market. Graphs, tables, diagrams, and illustrations.

5907 Application of Linear Analysis to an Experimental Investigation of a Turbojet Engine With Proportional Speed Control. Marcel Dandois and David Novik. National Advisory Committee for Aeronautics, Technical Note 2642, Feb. 1952, 38 pages. (TL570 Un3t)

Results of an analytical and a sea-level experimental investigation of a turbojet engine with proportional speed control are presented.

5908 Effect of Mach Number on the Flow and Application of Compressibility Corrections in a Two-Dimensial Subsonic-Transonic Compressor Cascade Having Varied Porous-Wall Suction at the Blade Tips. William B. Briggs. National Advisory Committee for Aeronautics, Technical Note 2649, Mar. 1952, 43 pages. (TL570 Un3t)

5909 Application of a Channel Design Method to High-Solidity Cascades and Tests of an Impulse Cascade With 90° of Turning. John D. Stanitz and Leonard J. Sheldrake. National Advisory Committee for Aeronautics, Technical Note 2652, Mar. 1952, 65 pages. T1570 Un3t)

Describes technique developed for application of above method to design of high-solidity cascades with prescribed velocity distributions as a function of arc length along the blade-element profile. The technique applies to both incompressible and subsonic linearized compressible, nonviscous, irrotational, fluid motion. 16 ref.

5910 A Thermodynamic Study of the Turbine-Propeller Engine. Benjamin Pinkel and Irving M. Karp. National Advisory Committee for Aeronautics, Technical Note 2653, Mar. 1952, 90 pages. (TL570 Un3t)

Equations and charts are presented for computing thrust, power output, consumption, and other performance parameters of a turbine-propeller engine for any given set of operating conditions and component efficiencies. Includes effects of pressure losses in the inlet duct and combustion chamber, variation of the physical properties of the gas as it passes through the system, and change in mass flow of the gas by addition of fuel. Total thrust horsepower per unit mass rate of air flow and specific fuel consumption are presented for a wide range of flight and engine-design operating conditions. Performance of a turbine-propeller engine containing a matched set of components is presented for a range of engine operating conditions. The flexibility of operation of 2 turbine-propeller engines is discussed.

5911 Two-Dimensional Flow on General Surfaces of Revolution in Turbo-Machines. John D. Stanitz and Gaylord O. Ellis, National Advisory Committee for Aeronautics, Technical Note 2654, Mar. 1952, 44 pages. (TL570 Un3t)

A method of analysis is developed for the above for steady, compressible, nonviscous, irrotational flow assumed to be uniform normal to the surfaces of revolution.

5912* The Adder—Power for Research. *Aeroplane*, v. 82, Mar. 7, 1952, p. 275-279.

Describes Armstrong Siddiley's Adder gas turbine used to power the new Saab delta-wing research airplane, the Australian pilotless target aircraft, and its use for reheat experiments by Armstrong Siddeley. A 2-page detailed diagram is given.

5913 Design Trends in Commercial Vehicles and Engines. Joseph Geschelin. *Automotive Industries*, v. 106, Apr. 1, 1952, p. 90, 92, 94, 96, 98.

A discussion of major trends that may affect the picture of transportation in the near future. Covers gasoline and diesel engines, liquefied petroleum gas, gas turbines, automatic drives, and power steering.

5914* Gas Turbines. Part I. I. G. Bowen. *Coke and Gas*, Mar. 1952, p. 87-92, 110.

Presents a survey of current gas-turbine design, indicates achieved and potential performance, and discusses possible applications in a wide range of industries. (To be continued.)

5915* Electronics in Automobile Engineering Research. J. R. Bristow. *Electronic Engineering*, v. 24, Apr. 1952, p. 189-192.

Surveys the above, including stress in vehicle structures, torsional fatigue, road-performance parameters, and noise in vehicles.

5916* Recent Developments in Electronic Engine Indicators. S. Hill. *Electronic Engineering*, v. 24, Apr. 1952, p. 207-209.

Surveys the above. Diagrams and illustrations.

5917* The Internal Combustion Engine From the Users Point of View. A. K. Bruce. *Engineer*, v. 193, Mar. 28, 1952, p. 436-437. (A condensation.)

Discusses various aspects in connection with the above.

5918* Three-Dimensional Flow in Axial Compressors. J. R. Schnittger. *Engineers' Digest*, v. 13, Mar. 1952, p. 89-90. (Translated and condensed from *Teknisk-Tidskrift*, v. 81, Dec. 15, 1951, p. 1087-1089.)

A theoretical treatment of the above problem. Diagrams.

5919* The Application of Gas Turbines in the Gas Industry. A. W. Pope. *Gas Journal*, v. 269, Feb. 6, 1952, p. 363-364, 369, 371.

Describes application in conjunction with continuous vertical retort plant. Extensive schematic diagrams show details.

5920* Combustion Processes in Engines. F. H. Garner. *Journal of the Institute of Fuel*, v. 25, Mar. 1952, p. 42-49.

Deals with the above in spark-ignition, compression-ignition, and gas-turbine engines. Includes vapor-phase oxidation of hydrocarbons, flame speeds, and carbon formation in combustion of hydrocarbons. 54 ref.

5921* Diesel-Oil Ashes—Tell This Inside Story. Ray McBrian. *Power*, v. 96, Apr. 1952, p. 112-113.

Discusses routine spectrographic analysis of the above in diesel-engine lubrication and service performance on the Denver & Rio Garnde R.R. Co. Helps avoid serious failures due to wear, corrosion, crankcase explosions, engine-deposit buildups, material failures, and others. Spectrograms, photographs, and table.

Books

5922 The Gas Turbine Manual. R. J. Welsh and Geoffrey Waller. 243 pages. 1951. Temple Press, Ltd., London. (TJ778 W44g)

Covers the history, fundamental theory, and operational features of the various types of turbines. Briefly discusses the properties required in construction materials. All important gas turbines built to date are listed. Includes a glossary of terms. 46 ref.

See also:

5716 (control system for engines)
5934 (thermal shock in rocket parts)
6031 (aircraft propellor handbook)
6509 (heat exchange in jet engines)
6642 (radar beacon for guided missiles)
6735 (rockets in interplanetary flight)

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5923* Constitutional Diagram of the BaO-Al_2O_3 System. (In Russian.) N. A. Toropov and F. Ia. Galakhov. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 1, 1952, p. 69-70.
Outlines recent work on the above.

5924* Comparative Investigation of the Structure of Porous Glass by Adsorption Methods and Under the Electron Microscope. (In Russian.) S. P. Zhdanov. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 11, 1952, p. 281-284.
Data of the above investigation are discussed and charted. Two photomicrographs.

5925 The Effect of Preparation Conditions on Tensile Strength of Soda-Lime-Silica Glass Rods. F. V. Tooley and G. F. Stockdale. *Journal of the American Ceramic Society*, v. 35, Apr. 1, 1952, p. 83-85.
Describes a study made of the relationship between conditions of specimen preparation and the tensile strength of small constricted soda-lime-silica glass rods.

5926 Fused Stabilized Zirconia and Refractories. O. J. Whittemore, Jr., and D. W. Marshall. *Journal of the American Ceramic Society*, v. 35, Apr. 1, 1952, p. 85-89.
Describes production of fused stabilized zirconia directly from ores in an electric-arc furnace. Various properties of refractories made from fused stabilized zirconia are listed. Uses include linings for furnaces operating to 2500°C., setters for firing titanates, containers for steel and Pt, and resistors for oxide-resistor furnaces. 12 ref.

5927 Differential Thermal Analysis of Kaolin Group Minerals Under Controlled Partial Pressures of H_2O. Robert L. Stone. *Journal of the American Ceramic Society*, v. 35, Apr. 1, 1952, p. 90-99.
The effect of water vapor on the decomposition temperature of kaolinite, halloysite, and dickite was investigated. Graphs and tabular data. 16 ref.

5928 Germania Glasses: The System Na_2O-CoO-GeO_2. N. M. Parikh and H. E. Simpson. *Journal of the American Ceramic Society*, v. 35, Apr. 1, 1952, p. 99-103.
The physical properties of some Na_2O-CaO-GeO_2 and Na_2O-CaO-SiO_2 glasses were compared. Properties determined were softening point, viscosity, annealing point, density, and refractive index. The possible constitution of these glasses is discussed briefly. Optical and transmissive properties, which were also determined, indicate possible new uses. 11 ref.

5929 Comparison of Warpage, Cross-Bend, Torsion, and Expansiometer Ring Tests on Titania Enamels. James F. Lochridge and Grant E. Miller. *Journal of the American Ceramic Society*, v. 35, Apr. 1, 1952, p. 103-106.
The major part of the work was conducted with the normal system of ground coat and cover coat. However, some comparative results are given for enamels applied directly on a Ti-bearing steel. The data obtained are shown graphically.

5930 Tunnel Kiln Testing. Morris P. Hall. *American Ceramic Society Bulletin*, Mar. 1952, p. 85-88.
Tunnel kilns are normally controlled and operated by a number of thermocouples placed in the crown of the kiln. Traveling thermocouples located in the setting showed that there are large differences between crown temperatures and ware temperatures, and between top and bottom of the setting. The test method is described, and typical curves are given.

5931 Adsorption of Water Vapor by Montmorillonite. I. Heat of Desorption and Application of BET Theory. II. Effect of Exchangeable Ions and Lattice Swelling as Measured by X-Ray Diffraction. R. W. Mooney, A. G. Keenan, and L. A. Wood. *Journal of the American Chemical Society*, v. 74, Mar. 20, 1952, p. 1367-1374.
Presents study of above, including reproducibility of isotherms, calculations, correlation of results with structure and other factors, and evidence that the absorbed water is present in discrete monolayers. Tables, graphs, and 16 ref.

5932* New Techniques in the Study of Setting and Hardening of Hydraulic Materials. J. Calleja. *Journal of the American Concrete Institute*, v. 23, Mar. 1952; *ACI Proceedings*, v. 48, 1952, p. 525-536.
Includes basic ideas for research using methods based on variation of the electrical resistance of a paste during its setting period. Theoretical considerations as well as experimental evidence show that the beginning and end of the setting period are indicated on resistance-time graphs by well-defined points.

5933* Calcium Chloride in Concrete. J. J. Shideler. *Journal of the American Concrete Institute*, v. 23, Mar. 1952; *ACI Proceedings*, v. 48, 1952, p. 537-559.
Presents test results on effects of type of cement, age, temperature, and mix proportions on strength of concrete containing $CaCl_2$, as well as effect of $CaCl_2$ on volume change, heat generation, time of set, alkali-aggregate reaction, resistance to abrasion, and sulfate attack of concrete. References to the work of other investigators and to some of their general conclusions are included. 27 ref.

5934* Resistance to Thermal Shock. E. Mayer. *Journal of the American Rocket Society*, v. 22, Mar.-Apr. 1952, p. 98.
Brief theoretical and mathematical analysis of the above as applied to refractory materials in rockets.

5935* Studies in Cement-Aggregate Reaction; The Effect on Mortar Expansion of the Particle Size of the Reactive Component in the Aggregate. H. E. Vivian. *Australian Journal of Applied Science*, v. 2, Dec. 1951, p. 488-494.
Above was examined experimentally, and results are presented and discussed. Tabular data.

5936 Abrasion-Resistant Refractory Materials as Applied to Blast Furnace Operations. Frank C. Roe and Herbert S. Schroeder. *Blast Furnace & Steel Plant*, v. 40, Apr. 1952, p. 429-435, 442, 458, 460.
Includes applications, abrasive action, test equipment, and procedure. Diagrams and illustrations.

5937* Fuel Consumption and Heat Balance of Ceramic Furnaces. (In German.) F. Lechner. *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.*, v. 28, Nov. 1951, p. 617-626.
Discussion includes charts and tables on experimentally established thermal efficiencies of different furnaces and fuels.

5938* Research and Applications Possibilities of a Refractory Clay Mineral. (In German.) Celestino Ficai and Luigi Ferro. *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V*, v. 28, Nov. 1951, p. 626-634.
Deals with the chemical composition, properties, and uses of an Italian clay, which is mainly a mixture of gibbsite and kaolinite. Results show that other refractory materials can be greatly improved by adding up to 20% of this new clay. Data are graphed and tabulated.

5939* On the Red Coloration of Tin Glazes. (In German.) W. Kerstan. *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.*, v. 28, Nov. 1951, p. 634-642.
Reviews literature on above and discusses experiments which show that the pink tinting of such glazes is mainly caused by CaO. To prevent this defect, it is recommended that the glazing body contain the least possible amount of Ca compounds. A supplement discusses colorimetric determination of Cr traces. 12 ref.

5940* A Cause of Warping of Sheets During Enameling. (In German.) A. Dietzel and E. Wegner. *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.*, v. 28, Nov. 1951, p. 642-649.
It is shown experimentally that sheet metals enameled on one side warp because of the sudden expansion upon passing the Ar_3 point. Also discusses the good behavior of sheet containing Ti, and factors to be observed in spraying the sheet with a thin layer of base enamel. Photographs, graphs, and tables.

5941* Ceramic Reactions in the Solid State. (In German.) M. F. Mehmel. *Berichte der Deutschen Keramischen Gesells-*

chaft e. V. und des Vereins Deutscher Emailfachleute e. V., v. 12, Dec. 1951, p. 689-699.

Mechanism of sintering of one-component and multicomponent bodies was studied. Results are tabulated and charted.

5942 Plastic Screw Joint for Clap Pipe. *Brick & Clay Record*, v. 120, Mar. 1952, p. 62-63.

Robinson Clay Products Company, Akron, Ohio, has announced development of a new-type joint and ceramic pipe for industrial use in conveying liquids and gases. This development combines plastic with vitrified clay to form a leak-proof, infiltration-proof joint.

5943 The Electrical Properties of Oxide Mixtures as an Index of Structural and Phase Changes at High Temperatures. W. F. Ford and J. White. *Transactions of the British Ceramic Society*, v. 51, Jan. 1952, p. 1-79.

A summary of fundamental knowledge relating to ionic conductors and dielectrics is followed by a rewiew of previous practical work and a description of apparatus developed to measure, at audio frequencies and under equilibrium conditions, the resistance capacity and loss angles of lime-alumina-silica mixtures freezing at 1266°C. Importance of the method for research on silicate and other mixtures is stressed and possible applications considered. Graphs, tables, and illustrations. 104 ref.

5944 Observations on the Behaviour of Firebricks on Reheating. A. H. B. Cross and P. F. Young. *Transactions of the British Ceramic Society*, v. 51, Jan. 1952, p. 80-94.

Measurements of the linear expansion or contraction of 10 brands of firebrick when reheated were made with special attention to temperature uniformity and total heatwork during the test. Results indicate that marked systematic variation of reheat shrinkage and expansion is fairly typical. Comparison of the result obtained by micrometer linear measurements with those deduced from volume measurements indicates preference for the latter.

5945 Tracer Studies of Diffusion in Set Portland Cement. J. W. T. Spinks, H. W. Baldwin, and T. Thorvaldson. *Canadian Journal of Technology*, v. 30, Feb.-Mar. 1952, p. 20-28.

Describes method developed for the study of the above using radioactive Na, Ca, I, and SO_4 ions. Results are charted, tabulated, and discussed.

5946* The Controlled Milling of Ceramic Materials. H. L. Podmore. *Ceramics*, v. 3, Feb. 1952, p. 621-625.

Deals with the provision of control in open-circuit grinding, such as for batch grinding in a ball mill.

5947 Silicate Cements. Raymond B. Seymour and Robert H. Steiner. *Chemical Engineering*, v. 59, Mar. 1952, p. 268, 270, 272-274, 276-278, 280-282, 284.

Presents charts for the corrosion resistance of silica-filled chemically setting silicate cements which will withstand higher temperatures than furane, phenolic, and sulfur cements.

5948* Important Developments in Concrete for Dams Reviewed. T. V. D. Woodford. *Civil Engineering*, v. 22, Mar. 1952, p. 28-31.

Discusses causes of deterioration, details of the phenomena accompanying the deterioration, the characteristic of cements and aggregates which contribute to the reaction, and means by which deterioration can be controlled or prevented. Illustrations. 10 ref.

5949 The Synthesis, Fabrication, and Properties of Beryllium Carbide. John H. Coobs and Walter J. Koshuba. *Journal of the Electrochemical Society*, v. 99, Mar. 1952, p. 115-120.

Methods that have been used in synthesizing beryllium carbide are critically reviewed. Physical and chemical properties are described. Physical properties of fabricated beryllium carbide-base bodies are discussed in detail, and the effects of graphite or beryllium oxide additives on properties of the bodies are disclosed.

5950 Fifty Years of Progress in Electrothermics: Electric Furnace Silicon Carbide Production. G. M. Butler. **Carbon and Graphite Electrodes.** C. G. Ollinger. **Arc Furnace Practice in the Manufacture of Aluminous Abrasives and Refractories.** John A. Upper. **New Refractories—Carbides, Borides, Nitrides, Silicides.** G. R. Finlay. **Electric Furnace Phorphorus Development.** Walter Wallace. **Electric Furnace Frro-Alloys and Calcium Carbide.** Joseph H. Brennan. **Electric Furnaces in the Iron and Steel Industry.** H. S. Newhall. **Electric Furnaces for Melting of Nonferrous Metals.** G. H. Clamer. *Journal of the Electrochemical Society*, v. 99, Mar. 1952, p. 51C-68C.

5951 Relationship Between Color, Type of Alkali Ions and Adherence of Ground Coats Containing Cobalt Oxide. H. C. Marshall and R. M. King. *Finish*, v. 9, Apr. 1952, p. 20-21, 54.

Refers to enameling of sheet iron. Data on the above are charted, tabulated, and discussed.

5952 Conservation in Enameling Operations. Evan Oliver. *Finish*, v. 9, Apr. 1952, p. 34-35, 38, 68-71.

Presents suggestions for conserving labor and materials and practical information on reworking of rejected parts. Illustrated.

5953 Colouring Oxides in Vitreous Enamels. *Foundry Trade Journal*, v. 92, Mar. 6, 1952, p. 255-258.

Discussion of article by W. Ball (Dec. 6, 1951 issue.)

5954* The Removal of Iron From Ceramic Raw Materials by Chlorine. I. The Removal of Iron From Pottery Raw Materials. (In Japanese.) Takamura Suzuki and Satoshi Tomizawa. *Reports of the Government Chemical Industrial Research Institute, Tokyo*, v. 46, July 1951, p. 205-211.

Shaped raw materials such as Amakusa and Gairomé clays which contained about 4% of ferric oxide were heated with Cl_2 at 800-1000°C. After treatment, the samples were crushed, their Fe contents measured, and the percentages of removed Fe to total Fe calculated. Only 1½ times the theoretical amount of Cl_2 was required and almost all of the Fe could be removed by the simple process. Test pieces for impact-strength experiments were prepared from powdered mixtures of clay, quartz, and feldspar. They were subjected to the Cl_2 treatment, then their impact strengths compared with those of test pieces not treated with Cl_2. No decrease in impact strength took place.

5955* Castables Simplify Refractry Applications. *Industry and Power*, v. 62, Apr. 1952, p. 97-98.

Discusses refractory concrete designed to resist corrosion and abrasion, withstand high temperature, or provide low thermal conductivity.

5955a A Note on Fused Stabilized Zirconia: A Modern High-Temperature Refractory. N. Clarke Jones. *Journal of the Institute of Fuel*, v. 25, Mar. 1952, p. 66-67.

Discusses manufacture, properties, and applications for the above.

5956* High Quality Structural Materials—The Great Buildings of Communism. (In Russian.) P. P. Budnikov. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, May, 1951, p. 644-651.

A discussion of developments and improvements in concrete and concrete structures.

5957* Cement Compositions for Large-Scale Hydroelectric Construction. (In Russian.) V. N. Iung. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, June 1951, p. 785-802.

Discusses the above under the headings: carbonization of cement solutions; shrinkage phenomena in concrete; creep of concretes; general technological requirements; technological classification and survey of "hydrotechnical" cements (1-, 2-, and 3-component types.)

5958* Salt Water as a Source Material for Preparation of Magnesia Cements and Heat-Resisting Materials. (In Russian.) P. P. Budnikov and A. A. Alent'ev. *Izvestiia Adademii Nauk SSSR*, Section of Technical Sciences, June 1951, p. 883-886.

Presents detailed information on percentage compositions of various types of the above. Includes photomicrographs.

5959 Technical Ceramics for Wear Resistant and Dimensionally Stable Parts. S. G. Kelley, Jr. *Materials & Methods*, v. 35, Mar. 1952, p. 88-91.

Exceptionally hard and dense vitreous-type ceramics are being

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used in such widely diverse applications as wire, twine and thread guides, drawing and extrusion dies, reference plates, and spacers in electronic equipment. Tables and illustrations.

5960 Lightweight Aggregates for Concrete. Clyde Williams. *Monthly Business Review*, v. 34, Mar. 1, 1952, p. 8.

Discusses advantages, properties, and new applications of the above. Describes plant expansion in the industry in the U. S. Future prospects are considered.

5961 The Testing of Ceramics. Henry N. Staats. *Non-Destructive Testing*, v. 10, Winter 1951-52, p. 23-26.

Describes 3 methods which have wide application in the ceramic industry for detection of defects. Briefly discusses ceramics in terms of physical appearance and nature to show what materials can be inspected with which method.

5962* Ferroxdure, A Class of New Permanent Magnet Materials. J. J. Went, G. W. Rathenau, E. W. Gorter, and G. W. van Oosterhout. *Philips Technical Review*, v. 13, Jan. 1952, p. 194-208.

Describes above consisting of oxide ceramics which do not contain Ni or Co. Typical properties of these materials (saturation, magnetization, and crystal structure), and some applications, are treated in the 3 parts of this article. Includes graphical data. 12 ref.

5963* A Resilient Flooring and Surfacing Composition. W. R. Tooke, Jr., and John C. Lane. *Research Engineer* (Georgia Institute of Technology), Jan. 1952, p. 5-6, 13-15.

Describes development of a new terrazo-type composition for application over rough concrete floors and other surfaces where a water-resistant, long-wearing, permanently attractive, moderate-cost covering is desired.

5964* Addition of Clinker Grit to Concrete. D. A. Wadia. *Rock Products*, v. 55, Mar. 1952, p. 92-93, 110.

Discusses the use of coarse-ground clinker in concrete mixes as a means of increasing ultimate strength.

5965* Production of Floor Tiles (Mosaic Plates). (In German.) Albert Vasel. *Sprechsaal für Keramik; Glass; Email*, v. 85, Jan. 20, 1952, p. 21-25; Feb. 5, 1952, p. 45-49; Feb. 20, 1952, p. 69-73.

Shows the value of ceramic floor tile as a covering for floors exposed to heavy traffic. A remedy for the problem of chipping is proposed and the process of making the tile is described in great detail. Includes flow diagram. Photographs, diagrams, and numerous references.

5966* Ultrasonics and Its Use in the Silicate Industries. (In German.) Friedrich Reinhart. *Sprechsaal für Keramik; Glas; Email*, v. 85, Feb. 20, 1952, p. 67-69.

Surveys varied applications of the above. 12 ref.

5967* Regeneration of Gypsum Molds in Ceramic Plants. (In Russian.) N. N. Fokina. *Steklo i Keramika*, v. 8, May, 1951, p. 17-20.

Experiments were made on the regeneration of used gypsum molds by several methods. Data are discussed, tabulated, and charted.

5968* Viscosity of Silicate Glass. (In Russian.) M. V. Okhotin. *Steklo i Keramika*, v. 8, June 1951, p. 5-7.

Experimental data were used to develop an equation expressing viscosity as a function of composition and temperature. Data are tabulated and charted.

5969* Rational Means of Treating Raw Materials for Glass Batches. (In Russian.) I. S. Blagoobrazov. *Steklo i Keramika*, v. 8, June 1951, p. 8-9.

Equipment for preparing raw materials for glass making is described and diagrammed.

5970* The Formation of S-Shaped Cracks. (In Russian.) M. S. Tarasenko. *Steklo i Keramika*, v. 8, June 1951, p. 16-18.

An investigation was made to determine the causes of S-shaped cracks in clay products and to establish ways of eliminating them. Results are discussed and illustrated.

5971* The Influence of Translucence of Glass on Its Clarification in the Furnace Bath. (In Russian.) V. I. Vanin. *Steklo i Keramika*, v. 8, June 1951, p. 20-21.

Presents results of investigation of the above in a Russian glass factory. Composition of the glass and other factors were studied. Data are discussed and tabulated.

5972* Calculations of the Strength of Hard Glass. (In Russian.) G. M. Bartenev and V. I. Rozanova. *Steklo i Keramika*, v. 8, July 1951, p. 10-14.

Equations are developed for expressing the stresses in hardened plate glass. These are used to derive equations that express the strength of glass either in tension or in bending. Data are discussed, tabulated, and charted.

5973* Casting of Porcelain-Glazed Articles Under Pressure. (In Russian.) P. N. Shvachinskii. *Steklo i Keramika*, v. 8, July 1951, p. 19-21.

An automatic machine for casting simple porcelain shapes is described. Details are diagrammed.

5974* Automatization of Technological Gasification of Fuel and Melting of Glass. (In Russian.) D. V. Zalizniak and M. Ia. Firer. *Steklo i Keramika*, v. 8, Aug. 1951, p. 5-8.

Various automatic controls for a glass plant are discussed.

5975* Methods of Intensification of the Drying of Ceramic Articles. (In Russian.) V. S. Kogan. *Steklo i Keramika*, v. 8, Aug. 1951, p. 16-17.

Presents a brief discussion of the above.

5976* Electrical Heating in Glass Production. Edward Meigh. *Times Review of Industry*, new ser., v. 6, Mar. 1952, p. 22-24.

Surveys and evaluates the above process in European industry. Includes furnaces using combined electrical and flame heating. Gives temperature-resistivity curves for various glasses.

5977* Iron and Glass. (In French.) J. de Jong. *Verres et Réfractaires*, v. 5, Dec. 1951, p. 303-311.

The behavior of small quantities of iron in glass was studied, mainly by measuring the transmission of the glass in the ultraviolet and infrared regions. Presents results of determinations of the equilibrium between ferrous and ferric ions in glass, done by means of optical and magnetic measurements. Includes charts and tables.

Miscellaneous Publications

5978 Fundamental Glass Research—Travelling Hopefully. James R. Johnson. *Engineering Experiment Station News* (Ohio State University), v. 24, Feb. 1952, p. 3-4, 31-32.

Brief discussion of the above, outlining problems and means for future research.

5979 The Flat Glass Industry. J. S. Gregorius. *Engineering Experiment Station News* (Ohio State University) v. 24, Feb. 1952, p. 5-12, 32-34.

Descriptive surveys of the above covering flat-drawn sheet, polished plate, and figured glass. Confined to the processes developed in the past 3 decades and currently in use. Diagrams and photographs.

5980 Glass Tank-Furnace Refractories. J. C. McMullen. *Engineering Experiment Station News* (Ohio State University), v. 24, Feb. 1952, p. 13-14, 34-35.

Brief account of the development, present status, and outlook for the above.

5981 Glass Block and Foamglas. Walter D. Ford and W. F. Lynsavage. *Engineering Experiment Station News* (Ohio State University), v. 24, Feb. 1952, p. 15-18, 35-36.

Discusses the above, covering properties, production, and applications. Photographs.

5982 Manufacture of Optical Glass. Murray R. Scott. *Engineering Experiment Station News* (Ohio State University), v. 24, Feb. 1952, p. 25-28, 39.

Describes methods specific to the above. Photographs.

5983 Differential Thermal Analysis of Clay Minerals Under Controlled Thermodynamic Conditions. Robert L. Stone. Engineering Experiment Station, Ohio State University, v. 20, Bulletin 146, Nov. 1951, 77 pages. (TA21 O36)

Describes apparatus developed for a truly dynamic gas system. Thermodynamic constants associated with the dehydration of certain clay minerals, namely, kaolinite, dickite, and halloysite are presented.

5984 The Structure of Clay Minerals. (A Survey of Developments in the Period 1940-1950.) G. W. Brindley. *Fourth International Congress of Soil Science, Transactions*, v. 1, 1950, p. 82-86. (S590 I8t4)

The above covers the kaolin group and the mica group. 33 ref.

5985 Some Remarks on the Interaction Between the Exchangeable Ions and the Adsorbed Wear Layers in Montmorillonite. Erik Forslind. *Fourth International Congress of Soil Science, Transactions*, v. 1, 1950, p. 110-113. (S590 I8t4)

The interaction mechanism between the exchangeable ions and the water lattice, assuming a crystalline structure of the water adsorbed on montmorillonite, is considered from the wave-mechanical point of view. The experimental work carried out to test the validity of the theoretical predictions is discussed.

5986 Differential Thermal of Clay Minerals. Robert C. Mackenzie. *Fourth International Congress of Soil Science, Transactions*, v. 2, 1950, p. 55-59. (S590 I8t4)

A method for the above is reviewed, outlining history, general advantages, and limitations. 28 ref.

5987 Moisture Content and Density of Some Clay Minerals and Some Remarks on the Hydration Pattern of Clay. C. T. DeWitt and P. L. Arens. *Fourth International Congress of Soil Science, Transactions*, v. 2, 1950, p. 59-62. (S590 I8t4)

Presents measurements of the above on montmorillonite, illite, ordovician bentonite, and kaolinite. Data are tabulated.

5988 Hydration of Vermiculite Saturated With Various Cations. G. F. Walker and A. Milne. *Fourth International Congress of Soil Science, Transactions*, v. 2, 1950, p. 62-67. (S590 I8t4)

Investigation shows that exchangeable Mg cations normally present in vermiculite can be replaced by a variety of other cations with concomitant alteration in the organization of the structural water layers. The amount of structural water present is also sensitive to changes in humidity, although less so than in the montmorillonites. 11 ref.

5989 Hydration of Layer Lattice Silicates With Exchangeable Cations. E. Gutierrez Rios and J. L. Martin Vivaldi. *Fourth International Congress of Soil Science, Transactions*, v, 2, 1950, p. 67-71. (S590 I8t4)

Shows how, by means of dehydration curves, to determine the amount of hydration water of a kaolin and of two fractions of Spanish Morocco bentonite saturated with cations of the alkali and alkaline-earth series. Determinations were carried out after equilibrium was reached at several vapor pressures. Data are tabulated.

5990 Surface Measurement for Ethylene Glycol Retention of Clays and Its Application to Potassium Fixation. S. B. Hendricks and R. S. Dyal. *Fourth International Congress of Soil Science, Transactions*, v. 2, 1950, p. 71-72. (S590 I8t4)

Data on the above for several clays are tabulated.

5991 Influence of Thermal Treatment on Some Physico-chemical Properties of Bentonite. A. Hoyos and J. Rodriguez. *Fourth International Congress of Soil Sciences, Transactions*, v. 2, 1950, p. 75-77. (S590 I8t4)

Variations caused by thermal treatment at different temperatures in exchange capacity and inhibition of water were studied.

5992 Variations of the Physico-Chemical Properties of Clays With Regard to the Grain Size. J. M. Albareda, V. Aleixandre, and J. Garcia Vicente. *Fourth International Congress of Soil Science, Tranactions*, v. 2, 1950, p. 80-82. (S590 I8t4)

The clay fraction of various soils was further divided into 3 sub-fractions. On each of these chemical composition; dehydration; neutralization and hygroscopicity curves; base-exchange, and microstructure were determined.

5993 A Tentative Method for the Determination of the Base Exchange Capacity of Clays. H. van Olphen. *Fourth International Congress of Soil Science, Tranactions*, v. 2, 1950, p. 97-99. (S590 I8t4)

Describes the above. It is based on exchange of the cations by strongly adsorbed organic cations, and is extremely simple, being carried out in a series of test tubes. Preliminary results indicate that the method may be applied to very small quantities of clays.

5994 Hydration of Various Silicates and Hydroxides. (In French.) Simonne Caillere and Stephane Henin. *Fourth International Congress of Soil Science, Transactions*, v. 3, 1950, p. 28-29. (S590 I8t4)

Discusses methods for obtaining separately flakes of various mineral species for study of the synthesis of clay minerals.

5995 Observation Under the Electron Microscope of Montmorillonite Saturated by Different Cations. (In French.) J. Mering, A. Mathieu-Sicaud, and I. Perrin-Bonnet. *Fourth International Congress of Soil Science, Transactions*, v. 3, 1950, p. 29-32. (S590 I8t4)

Describes methods for electron-microscope study of monocrystals of Na montmorillonite. Includes chart showing a systematic method for study of the above.

5996 Synthesis of Nickel Hydrosilicates. P. Franzen and J. J. B. van Eyk van Voorthuysen. *Fourth International Congress of Soil Science, Transactions*, v. 3, 1950, p. 34-37. (S590 I8t4)

Discusses the compounds in the system NiO-SiO_2-H_2O. Thermal analysis of some coprecipitates and synthetic Ni clays are presented.

5997 Action of Heat on Clay Minerals. (In French.) Simonne Caillere. *Fourth International Congress of Soil Science, Transactions*, v. 3, 1950, p. 54-63. (S590 I8t4)

Transformations likely to occur in a clay during heating were studied by 3 methods: thermal, thermogravimetric, and dilatometric analysis. Includes charts and tables. 10 ref.

5998 The Research Program for the Refractories Fellowship of Mellon Institute. S. M. Phelps. Refractories Institute (Pittsburgh), Technical Bulletin 89, Feb. 1952, 10 pages. (TN677 A35t)

Books

5999 Glass. J. Home Dickson. 300 pages. 1951. Hutchinson's Scientific and Technical Publications, New York. (TP848 D56g)

Part I deals with the physics and chemistry of glass, explains as far as possible its structure and reactions with other substances. Part II describes the manufacture of glass and of glass articles. Part III covers a number of the more important applications of glass. An appendix deals with its spectral transmission. Includes a chapter on glass-to-metal seals.

6000 Glass and W. E. S. Turner: 1915-1951. E. J. Gooding and Edward Meigh, editors. 144 pages. 1951. Society of Glass Technology, Sheffield, England. (TP854.G7 G61g)

Gives a picture of the progress of the glass industry from the day Turner first "invaded" it in 1915 to his seventieth birthday in 1951. Includes chapters on the composition of glass, melting processes, and the evolution of refractories for glass-making.

6001 Elements of Ceramics. F. H. Norton. 246 pages. 1952. Addison-Wesley Press, Cambridge, Mass. (TP807 N82e)

Covers the broad principles of ceramics based on an approach from crystal physics and unit processes. Numerous diagrams, graphs, and illustrations. Chapter references.

6002 Coloured Glasses. Woldemar A. Weyl. 541 pages. 1951. Society of Glass Technology, Sheffield, England. (TP862 W54c)

One of a series of monographs. The original version appeared in the Society's *Journal* in 6 sections in 1943, 1944 and 1946.

22. *Ceramics*

The original version has been thoroughly revised and amplified. Footnote references.

6003* The Directory of British Clayworkers. 145 pages. 1951-1952. British Clayworker, London. (Directory Shelf.)

Presents a list of names and addresses of British firms in the heavy clay, refractory and ceramic industries. List is almost entirely made up from the subscription files of *British Clayworker.*

See also:
5205 (sintering of WC-Co cements)
5276 (nickel flash prior to porcelain enameling)
5320 (de-enameling methods)
5412 (emissivity of refractory oxides)
5558 (refractories for metallurgical processes)
5817 (ceramic dental materials)
5885 (kiln-performance studies)
6193 (heat treatment of gibbsite)
6317 (glass-reinforced plastics)
6429 (differential thermal analysis of clays)
6430 (advances in clay-mineral technology)
6432 (hydration of montmorillonite)
6433 (electrokinetic behavior of clay minerals)

23. LUBRICATION AND FRICTION

6004* Variations of the Oiliness of Lubricants in the Presence of Elevated Pressures. (In French.) Grégoire Volovick. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Feb. 25, 1952, p. 916-918.

Presents a brief theoretical study of the above. Includes chart showing variations of oiliness in the presence of N_2 under pressure.

6005 Phthalocyanine Lubricating Greases. Vincent G. Fitzsimmons, Robert L. Merker, and Curtis R. Singleterry. *Industrial and Engineering Chemistry,* v. 44, Mar. 1952, p. 556-563.

Describes the investigation of a nonsoap gelling agent for lubricating greases. Phthalocyanine was found to give products similar in texture, bleeding rate, and lubricating performance to conventional soap greases. 24 ref.

6006* The Four-Ball E. P. Tester. D. K. Nason. *Institute Spokesman,* v. 15, Mar. 1952, p. 22-31.

The object of the work described, carried out with the above tester, was to investigate changes in the Navy procedure in order to shorten the time required to determine the Mean Hertz Load value of a lubricant without sacrificing the accuracy of the original Navy test. Apparatus is diagrammed and illustrated; data are tabulated and charted.

6007* The Discharge of Gases From Laminally Flowing Liquids. (In German.) Frank C. Roesler. *Zeitschrift für angewandte Physik,* v. 3, Oct. 1951, p. 356-379.

Proposes a method for calculating the rate of above process, on the basis of the literature. The calculation shows that superfluous, dissolved gas is discharged within a very short time in case of the high shearing rates existing in bearings.

Miscellaneous Publications

6008 Influence of Lubricant Viscosity on Operating Temperatures of 75-Millimeter-Bore Cylindrical-Roller Bearing at High Speeds. E. Fred Macks, William J. Anderson, and Zolton N. Nemeth. National Advisory Committee for Aeronautics, Technical Note 2636, Feb. 1952, 47 pages. (TL570 Un3t)

A 75-mm.-bore, cylindrical-roller, inner-race-riding, cage-type bearing was used in an experimental investigation of effect of oil viscosity on bearing operating characteristics over a range of DN values from 0.3 to 1.2×10^6. A previously developed cooling-correlation analysis was extended to include fully the effect of varying lubricant viscosity. This improved correlation makes it possible to predict either the inner- or the outer-race bearing temperatures from single curves regardless of whether speed, load, oil flow, oil-inlet temperature, oil-inlet viscosity, oil-jet diameter, or any combination of these parameters is varied over wide ranges. 23 ref.

See also:
5542 (MoS_2 as corrosion-preventive lubricant)
6194 (aqueous lubricants)
6195 (adsorption of lubricant monolayers)
6317 (electrical design factors for new plastic)
6557 (microscopic study of friction and wear)

24. DESIGN

6009 Super "Nerve Center" Cam Has 720 Exact Stations on 1 Sq. In. John W. Mallory. *American Machinist,* v. 96, Mar. 31, 1952, p. 83-86.

Gives step-by-step story of manufacture of master control cam for automatic control of aircraft in flight. Certain details are not revealed for reasons of national security.

6010* Gear-Tooth Stresses and Rating Formulae. H. E. Merritt. *Engineer,* v. 193, Mar. 7, 1952, p. 341-343; Mar. 14, 1952, p. 384-387.

Considers the present state of knowledge. Examines the consistency of methods and of empirical factors in use for comparing gear-tooth stresses and determining permissible loading. Graphs and diagrams.

6011* Simplified Standards for Gears. W. A. Tuplin. *Engineer,* v. 193, Mar. 21, 1952, p. 394-397.

Presents details of simplified design procedure and compares it with conventional procedure. Diagrams and graphs.

6012 Design of Gray Iron Castings. Thomas E. Eagan. *Foundry,* v. 80, Apr. 1952, p. 108-110, 261, 263.

Discusses factors involved in the above with respect to the best and simplest design to attain the required properties.

6013 Design of Iron Castings. K. H. Collinson. *Foundry Trade Journal,* v. 92, Feb. 28, 1952, p. 217-219; disc., p. 219-221.

Discusses the development of new conceptions in industrial design. From the discussion, it appears that making castings for woodworking tools is not particularly remunerative and that foundry methods, casting quality, and finish have to be related to this factor.

6014 Design of Manifolds and Pipe Burners. Part III. J. D. Keller. *Industrial Heating,* v. 19, Mar. 1952, p. 436, 438, 440, 442.

Series of articles is concluded by a discussion of laminar-flow conditions in manifolds.

6015 How to Design for Repeated Loads. R. L. Templin and E. C. Hartmann. *Iron Age,* v. 169, Mar. 27, 1952, p. 98-101.

Describes recommended procedures. "Do's" and "Dont's" for obtaining increased fatigue strength are presented in tabular form.

6016* Basic Theory of the Precision of Mechanisms and Basic Theory of Real Mechanisms. (In Russian.) N. G. Bruevich. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, May 1951, p. 722-741.

The above theories are discussed in detail. 16 ref.

6017* Certain Controversial Questions in the Theory of Precision of Mechanisms. (In Russian.) L. A. Arkhangel'skii. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, May 1951, p. 742-750.

Four of the above questions are discussed.

6018* The Experimental Approach to Aircraft Structural Research; The Fifteenth Wright Brothers Lecture. P. B. Walker. *Journal of the Aeronautical Sciences,* v. 19, Mar. 1952, p. 145-160; disc., p. 161-172.

Presents the experimental approach in terms of recent work done in Great Britain and particularly at the Royal Aircraft Establishment. One aspect of research considered is the testing of small specimens made of Xylonite. Another is the strength testing of actual aircraft, which opens up several fields of research activity for discussion. Design studies of new testing equipment for large aircraft and for pressurized cabins are also described. Consideration is given to the measurement of external forces in flight and the design of measuring instru-

ments, including a description of the new counting accelerometer recently developed by the R.A.E. Finally, structural fatigue is discussed.

6019 Solving the Thermal Problem for Enclosed Gear Drives. E. J. Wellauer. *Machine Design*, v. 24, Mar. 1952, p. 123-127.

Presents data useful in determining the thermal capacities of enclosed gear drives as well as information which can be utilized to reduce frictional losses.

6020 Mechanisms for Intermittent Motion. Part 4. Otto Lichtwitz. *Machine Design*, v. 24, Mar. 1952, p. 147-155.

Discusses intermittent-motion gears for intersecting and crossing shafts. Diagrams.

6021 Unground Ball Bearings. F. Russell Smith. *Machine Design*, v. 24, Mar. 1952, p. 156-158.

Describes the above. They are assembled with a full complement of balls which, at low speeds, enable them to withstand relatively high loads. They are designed for radial loads, thrust loads, and angular-contact loads.

6022 Equivalent Number of Teeth for Bevel Gears. C. J. Schorsch. *Machine Design*, v. 24, Mar. 1952, p. 159-161.

Presents a nomogram for finding the above. Includes numerical examples.

6023* The Problem of Equalizing Errors in Measuring Internal Stresses in Hollow Cylinders and Tubes. (In German.) H. Böhler and W. Schreiber. *Metall*, v. 6, Feb. 1952, p. 77-80.

Presents details of application of the least-square method to above problem.

6024* The Bending of Thin Anisotropic Plates. Edit Illing. *Quarterly Journal of Mechanics and Applied Mathematics*, v. 5, Mar. 1952, p. 12-28.

Solutions for some of the bending problems of the clamped circular plate are derived by the method of complex potentials. Results indicate that anisotropy of the material does not become evident unless the distribution of applied pressures is of quadratic or higher order. In the latter cases, the analysis is very involved, but unique solutions for the deformation of the plate can be obtained. 10 ref.

6025* On the Combined Torsion and Tension of a Partly Plastic Circular Cylinder. F. A. Gaydon. *Quarterly Journal of Mechanics and Applied Mathematics*, v. 5, Mar. 1952, p. 29-41.

Particular combinations of twist and extension of a solid circular cylinder are considered. The Reuss equations are used throughout and are integrated, for different cases, to give shear stress and tension in the plastic material. A more general case, in which the twist and extension are such as to make the ratio of load to torque constant, is solved numerically. Residual stresses are evaluated, after partial unloading, for a bar which has been twisted and extended in constant ratio.

6026 Some Practical Hints on Special Die Design. Federico Strasser. *Sheet Metal Industries*, v. 29, Mar. 1952, p. 230-234, 236.

Presents some practical suggestions and simple solutions to problems encountered in practice as an aid in designing and building special cutting dies. Diagrams.

6027* Coal Combine UKT for Mining Thin, Slightly-Sloping Veins. (In Russian.) A. D. Gridin, E. I. Kudriashev, A. A. Pichugin, and N. Ia. Merkulov. *Ugol*, v. 26, Aug. 1951, p. 14-19.

A combined cutting and loading machine for inclined deposits is described and the economics of its utilization discussed. Illustrations, diagrams, and graphs.

6028* First Summary of the Use of Combines (Mining Machines) on Steeply Inclined Veins in Mines of the Artemygol Combine. (In Russian.) Iu. M. Rubinskii and S. S. Rodbort. *Ugol*, v. 26, Aug. 1951, p. 19-24.

Extensive tests of mining machines were made from June 1950 to June 1951 in the above mines. Results are discussed and tabulated.

Miscellaneous Publications

6029 Studies of Slab and Beam Highway Bridges. Part III. Small-Scale Tests of Shear Connectors and Composite T-Beams. C. P. Siess, I. M. Viest, and N. M. Newmark. Engineering Experiment Station, University of Illinois, v. 49, Bulletin Series 396, Feb. 1952, 133 pages. (T1 16b)

Three types of tests of shear connectors for composite concrete and steel I-beam bridges are reported: tests of push-out specimens, static tests of composite T-beams, and tests of composite T-beams in fatigue. All specimens tested were approximately ¼-scale models. The push-out specimens were made with various types of rigid and flexible connectors; the T-beams were made with channel shear connectors only. Test results are extensively tabulated and charted.

6030 Compressive Buckling of Flat Rectangular Metalite Type Sandwich Plates With Simply Supported Loaded Edges and Clamped Unloaded Edges. Paul Seide. National Advisory Committee for Aeronautics, Technical Note 2637, Feb. 1952, 27 pages. (TL570 Un3t)

A theoretical solution is obtained for the above problem. The solution is based upon the general small-deflection theory for flat sandwich plates developed in NACA Report 899. A comparison is made between the results and other solutions of the problem. A comparison is also made between the present theory and experimental results for two types of sandwich plates having Alclad 24S-T Al-alloy faces and end-grain balsawood or cellular-cellulose-acetate cores.

Books

6031 Aircraft Propeller Handbook. Ed. 2. Karl Hansson Falk. 146 pages. 1943. Ronald Press, New York. (TL705 F18a2)

Includes data on design, static and gyroscopic characteristics, twisting moments, strength, and vibrations in propellers.

6032 Strength of Materials. Max M. Frocht. 439 pages. 1951. Ronald Press Co., New York. (TA405 F92s)

Discusses contemporary problems and methods of investigating strength of materials. First 3 chapters deal with fundamental concepts and statically determinate problems in tension, compression, bending, and torsion. Remaining chapters give detailed discussion on various aspects of strains and stresses. Chapter problems.

6033 A New Approach to Engineering Tolerances. J. Gilson. 99 pages. 1951. Machinery Publishing Co., London. (TA368 G42n)

A critical presentation of the considerations necessary for the allocation and maintenance of realistic tolerances in modern economic production. Includes production factors and economic tolerances for various fabrication and assembly processes, means of expressing tolerances on drawings, effects of tolerances on fits, and standard limit-and-fit systems.

6034 Mechanics Applied to Vibrations and Balancing. D. Laugharne Thornton. 584 pages. 1951. Chapman & Hall, London. (TA355 T39m2)

Presents a general survey on the above. A new chapter includes the transmission of stress under conditions of rapidly applied loading, such as in design of fortifications and structures to withstand the effects of explosion.

6035 Structural Theory and Design. Vol. I. J. McHardy Young. 283 pages. 1950. Crosby Lockwood & Son, Ltd., London.

The above is intended primarily for the student or young engineer. Although it deals with the methods of rigorous analysis, it indicates the application of first principles to practice.

See also:

5256 (weld design—book)
5482 (calculation of stresses in flywheels)
5900 (turbine design)
5901 (design of gas-turbine engine)
6332 (design consideration for machining plastics)
6374 (rubber as engineering material)
6722 (aircraft design trends)
6725 (machine for delinting cottonseed)

25. CHEMICAL TECHNOLOGY

6036* Copper As a Textile Fiber Preservative. H. L. von Goehde. *American Dyestuff Reporter*, v. 41, Mar. 17, 1952, p. 164, 179.

Briefly reviews literature on the above. 10 ref.

6037* Extenders; Covering Talc, Clay, Calcium and Magnesium Carbonates, and Blanc Fixe in Printing Ink. A. J. Gitter. *American Ink Maker*, v. 40, Mar. 1952, p. 30-34, 65.

Deals with the production and availability of white extenders. Designed to give the ink maker a better conception of how white extenders are produced commercially.

6038 A Comparison of Five Commercial Solvents for Extraction of Cottonseed. P. H. Eaves, L. J. Molaison, C. L. Black, A. J. Crovetto, and E. L. D'Aquin. *Journal of the American Oil Chemists' Society*, v. 29, Mar. 1952, p. 88-94.

Presents data obtained in comparative testing of 5 different commercial oil solvents as extractants for cottonseed by pilot-plant-scale batch extraction, showing the effect of each solvent on yield, composition, and qualities of the products. 41 ref.

6039* Diffusion in Wood. Part I. A Quantitative Theory of Diffusion in Porous Media and Its Application to Wood. G. N. Christensen and E. J. Williams. **Part II. The Temperature Coefficient of Diffusion Through Wood.** G. N. Christensen. **Part III. Ion Selection and Its Effect on the Diffusion of Electrolytes.** G. N. Christensen. *Australian Journal of Applied Science*, v. 2, Dec. 1951, p. 411-453.

Aspects of wood diffusion were studied with respect to their physical chemistry. Illustrations and tabular data. 31 ref.

6040* Present Status of Processing Petroleum Hydrocarbons Into Chemical Products. (In German.) W. Grimme. *Brennstoff-Chemie*, v. 33, Feb. 1952, p. 37-48.

Includes schematic diagrams showing flowsheet of some major processes. 23 ref.

6041* Sulphuric Acid and Liquid Sulphur Dioxide Manufactured From Smelter Gases at Copper Cliff, Ontario. R. W. Allgood. *Canadian Mining and Metallurgical Bulletin*, v. 45, Mar. 1952, p. 153-155; *Transactions of the Canadian Institute of Mining and Metallurgy*, v. 55, 1952, p. 123-125.

Discusses briefly the general factors associated with the recovery of sulfur in connection with the above, in view of the current sulfur shortage. Flow sheets.

6042* Sulphur Recovery From Turner Valley Gas. G. A. McGuffin. *Canadian Mining and Metallurgical Bulletin*, v. 45, Mar. 1952, p. 156-159; *Transactions of the Canadian Institute of Mining and Metallurgy*, v. 55, 1952, p. 126-129.

A short discussion of each of the following subjects: properties and uses of sulfur; existing sources; market research; the recovery process in Turner Valley; and hazards of sulfur production. Flow diagrams.

6043 The Alchemy of Arvida. Wm. G. Dulmage. *Canadian Chemical Processing*, v. 36, Mar. 1952, p. 70-71, 74.

Discusses role of chemistry at Alcan (Canada) by following through the various steps in Al production in normal sequence, particularly concerning alumina. Briefly describes the Company's production of HF, AlF_3, synthetic cryolite, NaOH, carbon lining and electrodes, and alum. Flow sheet.

6044 High-Pressure Hydrogenation; Some Modern Trends in the Up-Grading of Heavy Oils. *Chemical Age*, v. 66, Mar. 8, 1952, p. 369-370, 379.

Briefly discusses some of the processes used in the above.

6045 Oils & Chemicals From Coal; Report of the Fuel Research Board for 1949-50. *Chemical Age*, v. 66, Mar. 8, 1952, p. 371-374.

Reviews above research.

6046 Review of Coal Tar Technology; Work Done From January-June 1951. *Chemical Age*, v. 86, Mar. 15, 1952, p. 403-405.

6047 Generalized Graphical Method for the Design of Fixed Bed Catalytic Reactors. Thomas Baron. *Chemical Engineering Progress* (Engineering Section), v. 48, Mar. 1952, p. 118-124; disc., p. 124.

Describes development of above method. Equations are derived from statistical considerations for effective lateral diffusivity of heat and mass. 17 ref.

6048 Fats: A Source of Chemicals. H. J. Harwood. *Chemical and Engineering News*, v. 30, Mar. 31, 1952, p. 1282-1284.

Reviews chemical reactions and industrial potentialities of the above.

6049 Reaction Kinetics in a Tubular Reactor. Thomas Baron, W. R. Manning, and H. F. Johnstone. *Chemical Engineering Progress* (Engineering Section), v. 48, Mar. 1952, p. 125-132.

Data were obtained in two tubular reactors on the oxidation of SO_2 catalyzed by vanadium oxide. The results led to a theoretical investigation of the nature of the interaction between the phases during the course of a heterogeneous reaction and demonstrated the general applicability of the method to precise studies of reaction mechanisms in flow systems. Experimental data including graphs and tables are presented. 10 ref.

6050 The Evaluation of Centrifuge Performance. Charles M. Ambler. *Chemical Engineering Progress* (Engineering Section), v. 48, Mar. 1952, p. 150-157; disc., p. 157-158.

Discusses various types of centrifuges and analyzes experimental tests. Diagrams, mathematical formulas, and illustrations.

6051* Principles of Fluidization. (In German.) Walter Brotz. *Chemie-Ingenieur-Technik*, v. 24, Feb. 1952, p. 60-81.

Photographs are used to explain the behavior of loose granular materials brought into motion by a stream of gas or liquid. Available literature of the author are used as the basis for quantitative data concerning the extent of pressure drop in fluidized beds, the minimum and maximum speeds at which a fluidized bed is still stable, and expansion of the bed due to turbulent motion of the granular material. Further data are included on other aspects. 108 ref.

6052* Forms of Flow and Heat Transfer in Moving Beds Which Have Been Brought Into Turbulent Motion by a Stream of Air. (In German.) E. Wicke and K. Hedden. *Chemie-Ingenieur-Technik*, v. 24, Feb. 1952, p. 82-91.

Upwash properties and hydrodynamic states of above beds were examined. A test unit and a method for measuring the heat transfer in such layers in comparison with loose materials at rest are discussed and an interpretation of the test values is given. 10 ref.

6053* Application and Limitations of Fluidization. (In German.) F. Schaub. *Chemie-Ingenieur-Technik*, v. 24, Feb. 1952, p. 98-103.

Discusses essential factors which must be observed in technical application of the above. Specific application to catalytic cleavage of hydrocarbons in the Fischer-Tropsch synthesis and for other processes is discussed in detail. 68 ref.

6054* Fluidized Bed Roasting Process of the Badische Anilin- & Soda-Fabrik. (In German.) Adolf Johannsen. *Chemie-Ingenieur-Technik*, v. 24, Feb. 1952, p. 104-109.

Reports on a new application of the Kinkler batch-fluidization process. Development work carried out in above plant since the war has shown that fluidization is very suitable for roasting iron pyrites in small lumps or in fine particles.

6055 Thermodynamic Functions of the Coal Ethylene Diamine System. I. G. C. Dryden. *Chemistry & Industry*, Mar. 1, 1952, p. 193-195.

Evaluates the above, essential to interpretation of solubility data for coal in above solvent. Data are tabulated and graphed.

6056 Gas Turbines and Their Possible Applications in the Chemical Industry. I. Lubbock. *Chemistry & Industry*, Mar. 8, 1952, p. 201-206.

Theoretical aspects are touched on only briefly, stress being placed on application to industrial processes.

6057 Cogelled Chromia-Alumina Catalyst for Naphtha Reforming; Evaluation of Hydrocarbon Types and Naph-

thas. E. C. Hughes, H. M. Stine, H. A. Strecker, S. C. Eastwood, C. L. Gutzeit, W. A. Stover, and S. J. Wantuck. *Industrial & Engineering Chemistry*, v. 44, Mar. 1952, p. 572-575.

Tells how naphthas can be reformed over chromia-alumina catalyst to very high octane levels. Data are graphed and tabulated. 12 ref.

6058 Hydrogenation of Shale Oil. W. M. Smith, T. C. Landrum, and G. E. Phillips. *Industrial & Engineering Chemistry*, v. 44, Mar. 1952, p. 586-589.

Hydrogenation was investigated as a means of removing N_2 and S compounds from shale oil. Hydrogenation of the crude shale oil at 3000 psig. over a fixed-bed catalyst consisting of nickel sulfide plus tungsten sulfide gave satisfactory operation and catalyst life with a minimum production of gasoline and other low-boiling components.

6059 Washing in Porous Media. H. E. Crosier and L. E. Brownell. *Industrial & Engineering Chemistry*, v. 44, Mar. 1952, p. 631-635.

Data are presented and general relationships developed for estimating the removal of filtrate by wash liquids miscible with the filtrate.

6060 Relative Magnitudes of Surface and Internal Resistance in Drying. Ralph E. Peck, Russell T. Griffith, and K. Nagaraja Rao. *Industrial & Engineering Chemistry*, v. 44, Mar. 1952, p. 664-669.

Above investigation takes into account the resistance offered by the air film at the surface of the specimen being dried. Results make is possible to predict the effect of velocity upon drying several thicknesses or the effect of thickness upon drying at a few velocities. 15 ref.

6061 Pigment Grade Iron Oxides; Recovery From Iron-Containing Waste Liquors. C. C. DeWitt, M. D. Livingood, and K. G. Miller. *Industrial & Engineering Chemistry*, v. 44, Mar. 1952, p. 673-678.

Two pilot plants, adaptable to the production of various synthetic iron oxides from iron-containing solutions such as waste pickle liquors, are described. Data are tabulated. 26 ref.

6062 Methods of Atomization in Spray Drying. Frank J. McEntee, Jr. *Industrial Heating*, v. 19, Mar. 1952, p. 504-510, 568. (A condensation.)

The common methods of atomization used in spray-drying systems for breaking up a fluid into very small dispersed droplets which can be rapidly dried are described. A brief review of the 4 basic operations involved in spray drying is included and several types of atomizing devices in commercial use are discussed.

6063* Studies on the Utilization of Low-Grade Pyrite. I. On the Combustion of Pyrite. (In Japanese.) Tomizo Yazaki and Kazuo Nakajima. *Reports of the Government Chemical Industrial Research Institute, Tokyo*, v. 46, July 1951, p. 189-198.

Presents results of experimental investigation of the above for generation of SO_2 to be used in production of H_2SO_4. An electric furnace with a porcelain tube was used. Results are charted, tabulated, and summarized in English.

6064* Studies on the Hydrogenation of Fatty Oils. VII. Hydrogenation of Soap of Sardine Oil in an Aqueous Solution. (In Japanese.) Tomataro Tsuchiya and Shigeru Kinomura. *Reports of the Government Chemical Industrial Research Institute, Tokyo*, v. 46, July 1951, p. 249-252.

6065* Symposium on Acid Sludge. *Journal of the Institute of Petroleum*, v. 38, Jan. 1952, p. 1-41; disc., p. 41-57.

Comprises 4 papers. First 3 are each entitled "Acid Sludge—Its Utilization and Disposal", A. Cluer; E. S. Squire, D. G. Pidgeon, and P. C. Jones; and W. E. Nieuwenhuis, respectively. The final paper is, "Acid Sludge—Its Utilization and Disposal at Manchester Oil Refinery", R. C. Cobley, H. Kaye, and R. K. Spencer. Reviews present disposal methods, and discusses possibilities of lowering the oil refiner's sulfur requirements. Includes tables and diagrams. 17 ref.

6066* Detergents From Petroleum. S. F. Birch. *Journal of the Institute of Petroleum*, v. 38, Feb. 1952, p. 69-82; disc., p. 82-87.

Describes chemistry and technology of production of the various types. 19 ref.

6067* The Identification of Bitumens by Colorimetric Methods. D. C. Broome and R. M. Edwards. *Journal of the Institute of Petroleum*, v. 38, Feb. 1952, p. 88-97.

Use of a specially designed photoelectric colorimeter for the above, in road building and asphalts, was proposed by one of the authors in 1953. The present paper summarizes work of a number of years of practical application of this principle. Use of a Spekker absorptiometer is now recommended. Application to various problems connected with manufacture and use of asphalt is discussed. 10 ref.

6068* Studies in Shale Oil. Part II. Some Water Soluble Constituents. Geo. E. Mapstone. *Journal of the Institute of Petroleum*, v. 38, Feb. 1952, p. 98-107.

Reviews literature and presents results of experiments on extraction of some of the above. 26 ref.

6069* Sebacic Acid Made in England. *International Chemical Engineering & Process Industries*, v. 33, Mar. 1952, p. 134-136.

Presents a short description of the manufacture of sebacic acid and its uses in the fields of plasticizers, synthetic resins, rubbers, and fibers.

6070* Modern Wood Preservatives. *International Chemical Engineering & Process Industries*, v. 33, Mar 1952, p. 138-140.

Presents summaries of papers dealing with the preservation of railway sleepers and green timber, laboratory testing of preservatives, fire-retardant chemicals, and the wood-preserving industry in North America.

6071* Chemical Bases of Modern Treatment of Petroleum. (In Russian.) S. R. Sergienko. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, June 1951, p. 803-812.

Modern methods and theories of refining crude oil are discussed, especially from the point of view of increased production.

6072* Chemicals From Pyrites. *Journal of Southern Research*, v. 4, Mar.-Apr. 1952, p. 11-13.

Describes ore refining and research at Tennessee Corp., where a variety of products are developed based on Cu resources. Thev have taken over a 100-yr-old Cu-mining activity and established a modern chemical processing enterprise that is producing an ever-growing list of valuable products.

6073 A Note on "Spotty" Ink Drying. R. R. Coupe. *Journal of the Oil & Colour Chemists' Association*, v. 35, Mar. 1952, p. 118-123.

An experimental survey was made of the fairly common ink drying defect known as "spotty" drying. Contrary to a frequently expressed opinion, it has been shown that the defect is not caused by variations in the paper or board but is a feature of the ink itself. The phenomenon is not restricted to a particular type of drier or pigment, and has on occasions been observed with lithographic varnishes. Some results depicting the influence of a dried ink film on the drying of a superimposed ink are presented.

6074* Residuum Hydrogenolysis vs. Coal Hydrogenation. Alfred Clark and W. C. Lanning. *Oil and Gas Journal*, v. 50, Mar. 10, 1952, p. 90-92, 120.

Evaluates the above, including cost, yield, and production data. Phillips Petroleum Co. reports pilot-plant results and preliminary economic studies for residuum hydrogenolysis. Cost analysis indicates that residuum hydrogenalysis is more feasible economically than straight hydrogenation. Tabular data.

6075* Hydrocarbon Extraction by Refrigeration. J. J. King and R. V. Mertz. *Oil and Gas Journal*, v. 50, Mar. 10, 1952, p. 95-97, 100, 116, 118.

Describes the above process at Tennessee Gas Transmission Co. plant near Greensburg, Ky. Diagrams dehydration, stripping, and refrigeration sections.

6076* Better Sulfur Removal. George Weber. *Oil and Gas Journal*, v. 50, Mar. 17, 1952, p. 619-170.

A new catalytic desulfurization process which provides a high degree of sulfur removal from gasoline, naphtha, kerosene, and gas oil has been developed by Anglo-Iranian Oil Co., Ltd. The Autofining process, employing a fixed-catalyst bed, operates

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at pressures of 50-200 psig. and makes use of a stable sulfur-resistant catalyst which has a long life. Catalyst is regenerated periodically, the on-stream period varying with the boiling range of the feed stock.

6077* Modern Processes. *Oil and Gas Journal*, v. 50, Mar. 17, 1952, p. 188-202.

Describes briefly, and includes flow diagram for a series of petroleum-refining processes.

6078 Desulfurization Makes Line-Gas in West Texas. Arch L. Foster. *Petroleum Engineer*, v. 24, Mar. 1952, p. C13-C16, C18.

Describes process whereby diethylene glycol-monoethanolamine-water mixture removes H_2S, water, and CO_2 from the raw gas. Illustration and diagrams.

6079 New 30-Ton Sulfur Recovery Plant at Calgary. Harry Chapin Plummer. *Petroleum Engineer*, v. 24, Mar. 1952, p. C33-C34, C36.

Describes above plant and process which will separate S from H_2S by addition of water to form O_2 and elemental S.

6080 Meeting Product Quality in Wax Crystallization. H. A. Lund. *Petroleum Processing*, v. 7, Mar. 1952, p. 326-332.

Discusses several grades of paraffin and microcrystalline waxes derived from refining of crude oil. Characteristics of 3 types of crystals were investigated in the absence of solvent. Graphs, photomicrographs, and tabular data.

6081 Literature Survey: Sulfur From Industrial Gases. Paul Zurcher. *Petroleum Processing*, v. 7, Mar. 1952, p. 333-338.

A comprehensive survey of processes for the above. 35 ref.

6082 How Much It Will Cost You to Recover Sulfur From H_2S. J. L. Parker. *Petroleum Processing*, v. 7, Mar. 1952, p. 338-339. (A condensation.)

Presents cost analysis. Includes tabular data.

6083 Continuous Contact Coking of Heavy Charge Material. E. R. Smoley and A. H. Schutte. *Petroleum Processing*, v. 7, Mar. 1952, p. 348-349.

Describes the above process applicable to a wide range of materials including petroleum pitches, asphalts, naturally occurring bitumens, and shale oil.

6084 Catalytic Cracking of High Nitrogen Charge Stock. J. W. Schall and J. C. Dart. *Petroleum Refiner*, v. 31, Mar. 1952, p. 101-103.

Gives results of a moving-bed catalytic-cracking pilot plant investigation of the above. This first article presents effects of process variables, particularly cracking temperatures, recycle ratio, and catalyst-to-oil ratio, on product distribution and product quality. (To be continued.)

6085 Extractive Crystallization—A New Separation Process. Part I. Theoretical Basis. Kenneth A. Kobe and William G. Domask. *Petroleum Refiner*, v. 31, Mar. 1952, p. 106-113.

A new separation process shows promise of providing the petroleum and petrochemical industries with an entirely new tool. It is based on the fact that urea selectively forms crystalline adducts with straight-chain compounds, while thiourea selectively forms similar complexes with many branched-chain and certain ring-type compounds. 39 ref. (To be continued.)

6086 Shale Oil Production and Refining Today. Part II. Peter W. Sherwood. *Petroleum Refiner*, v. 31, Mar. 1952, p. 134-138.

Describes the retorting processes for shale-oil recovery which have been commercially established or which have shown a definite favorable potential. (To be continued.)

6087* The Development of Fluorine Production. H. R. Leech. *Research*, v. 5, Mar. 1952, p. 108-115.

Describes common methods in use for the production of fluorine and some of the practical aspects of handling it. 27 ref.

6088* Theoretical Conditions for Avoiding the Formation of Lampblack in the Reforming of Methane. (In Italian.) G. Bellini. *Rivista dei Combustibili*, v. 5, Dec. 1951, p. 694-700.

Reactions which can take place in the reforming of methane are considered, and their equilibrium constants at different temperatures determined. Minimum steam/methane ratio for avoiding carbon-black formation is calculated.

6089* Interpretation of Tests for Resistance to Abrasion of Textiles. Herbert F. Schiefer and Carl W. Werntz. *Textile Research Journal*, v. 22, Jan. 1952, p. 1-12.

Resistance to abrasion of 16 cotton fabrics, which varied systematically in warp and filling yarn number and in ends and picks, was determined with the Schiefer abrasion-testing machine. 14 ref.

6090* Cellulose Studies. Part XVI. The Reaction of Cellulose With Formaldehyde. Robert E. Wagner and Eugene Pacsu. *Textile Research Journal*, v. 22, Jan. 1952, p. 12-20.

A new method for reacting cellulose for formaldehyde in the vapor phase using acid catalysts is described. The results of reaction conditions where catalyst concentration ranged from 1-10% and reaction temperature ranged from 110 to 150°C. are presented. 20 ref.

6091* Effects of Tension on the Swelling of Cotton Fibers. Ruth Giuffria and Verne W. Tripp. *Textile Research Journal*, v. 22, Jan. 1952, p. 21-25.

Changes in the cross-sectional area and circularity of cotton fibers tensioned in water and other media were measured microscopically. Results are presented and discussed.

6092* Heat-Resistance of Partially Acetylated Cotton Fabrics. Edith Honold, Janice M. Poynot, and Alvo F. Cucullu. *Textile Research Journal*, v. 22, Jan. 1952, p. 25-29.

Presents results of an investigation undertaken to evaluate the influence of heat on partially acetylated cotton fabrics as compared with an unacetylated control of the same original material. Comparisons were made of the effect of heating the fabrics at 160°C. in an inert atmosphere of dry nitrogen, in dry air, in water vapor, and in a mixture of air and water vapor.

6093* An Analysis of the Consumer Quality Characteristics of Cotton; Implications for Research. George S. Buck, Jr. *Textile Research Journal*, v. 22, Feb. 1952, p. 117-122.

6094* Graphical Method for Design of Apparatus for Continuous Reactions in the Liquid Phase. (In Russian.) I. V. Provinteev. *Zhurnal Prikladnoi Khimii*, v. 24, Aug. 1951, p. 807-816.

Includes schematic designs of apparatus.

Books

6095 Safety in Petroleum Refining and Related Industries. Ed. 1. George Armistead, Jr., compiler. 416 pages. 1950. John G. Simmonds & Co., New York. (TP690 Ar55s)

Contains sections relating to each of the basic causes of accidents, as well as on special equipment for accident prevention and protection of facilities. Emphasis is on prevention, although sections are devoted to protective measures including fire control and extinguishment and fireproofing of structures.

6096 Pulp and Paper; Chemistry and Chemical Technology. Vol. I. Pulping and Papermaking. James P. Casey. 795 pages. 1952. Interscience Publishers, New York. (TS1105 C26p)

Presents the fundamental chemistry of paper, its manufacture, and use. Study of the papermaking raw materials and processes is given from the standpoint of the colloidal and physical chemist.

6097 Reaction Kinetics in Chemical Engineering. Olaf A. Hougen. 74 pages. 1951. American Institute of Chemical Engineers, New York. (*Chemical Engineering Progress* Monograph Series, v. 47, no. 1.)

Describes the historical development of chemical kinetics as applied to process design, the present status of this technology, and the most promising fields for immediate investigation. 287 ref.

6098 The Chemistry and Technology of Food and Food Products. Vols. I-III. Morris B. Jacobs, editor. 2580 pages. 1951. Interscience Publishers, New York. (TX531 J15c2)

Vol. I covers the fundamental aspects of food chemistry. Vol. II concerns descriptive aspects of particular food groups and includes some account of the history, statistics, definitions, standards, composition, and chemistry of these food groups. Vol. III presents principal methods of preserving foods and methods of production.

6099 The Acetylene Industry and Acetylene Chemistry in Germany During the Period 1939-1945. Part I. Industrial Production and Use of Acetylene. R. Owens. **Part II. Acetylene Chemistry.** A. W. Johnson. 157 pages. 1951. His Majesty's Stationery Office, London. (BIOS Surveys, Report 30.) (TP767 G79a)

Part I deals with industrial production and use of acetylene. Part II is concerned with the chemical reactions involved in various processes.

6100* Encyclopedia of Chemical Technology. Vol. 8. Ion Exchange to Metal Plating. Raymond E. Kirk and Donald F. Othmer, editors. 944 pages. 1952. Interscience Encyclopedia, New York. (TP9 E19)

6101 Oil, Fat, and Soap. Benjamin Levitt. 230 pages. 1951. Chemical Publishing Co., Inc., New York. (TP670 L57o)

Presents an over-all picture of raw materials, manufacturing processes, and testing methods. Definitions are given and examples are cited to illustrate commercial practice.

6102 Ultrasonics—Two Symposia. F. J. Van Antwerpen, editor. 81 pages. 1951. American Institute of Chemical Engineers, New York. (QC243 An89u)

These symposia present, through experts and investigators in the field of applied acoustical energy, some of the principal limitations and potentialities of applying ultrasonic energy to chemical-engineering processes and operations. Panel discussions. Chapter bibliography.

6103 Progress in Petroleum Technology. Robert E. Wilson, chairman. 392 pages. 1951. American Chemical Society, Washington, D. C. (TP690 Am353p)

A collection of the papers presented at the Symposium on Twenty-Five Years of Progress in Petroleum Technology held by the Division of Petroleum Chemistry of the American Chemical Society. Covers all phases of the above with the exception of exploration, production, devices for evaluating oil products, and insecticides. Chapter bibliography.

6104 Annual Report on Essential Oils, Aromatic Chemicals, and Related Materials—1947-1948. 125 pages. 1951. Schimmel & Co., New York. (TP983 Sch34a)

Discusses commercial and scientific developments in the above. Includes data on sources, biogenesis, methods of analysis, antibiotic activity, and odor perception. 230 ref.

6105 Paper and Paperboard. 126 pages. Oct. 1951. American Society for Testing Materials, Philadelphia. (TS1109 Am35p)

Provides an authoritative discussion of the characteristics of different types of paper and of the significance of tests applied to them. Includes paper terms and nomenclature.

See also:

5064 (production of tungsten chemicals)
5655 (chromatography in petroleum refining)
6300 (lignin chemistry—book)
6309 (resin treatment of cotton fabrics)
6372 (petroleum products in rubber compounding)
6415 (byproducts of Southern Agriculture)
6575 (filtration of liquids)
6680 (statistical methods in chemical industry)
6698 (sulfur from coal)
6769 (Forest Products Research Guide)

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6106* Structures of Molecular Addition Compounds. III. Ammonia-Boron Trifluoride, H_3N-BF_3. (In English.) J. L. Hoard, S. Geller, and W. M. Cashin. **IV. Trimethylamine-Boron Trifluoride, $(H_3C)_3N$-BF_3.** S. Geller and J. L. Hoard. **V. Comparison of Four Related Structures.** J. L. Hoard, S. Geller, and T. B. Owen. *Acta Crystallographica*, v. 4, Sept. 1951, p. 396-407.

Presents and interprets X-ray diffraction data from single crystals of above compounds. Part V gives detailed comparisons of structural results obtained for H_3CH_2N-BF_3, H_2CCN-BF_3, H_3N-BF_3 and $(H_3C)_3N$-BF_3. Shows that the structural data form a self-consistent pattern which correlates well with the limited available information on the relative stabilities of the addition compounds. 36 ref.

6107* Structure Transition and Antiferromagnetism in Magnetite. (In English.) N. C. Tombs and H. P. Rooksby. *Acta Crystallographica*, v. 4, Sept. 1951, p. 474-475.

Reports results of a new investigation of the crystal structure of magnetite at temperatures down to that of liquid air. By means of x-ray powder photographs it was possible to show that a structure transition occurs at low temperature, and that this comprises a rhombohedral deformation of the ideal cubic lattice. 11 ref.

6108* Supersaturation of the Negative Ions Na, K, O, OH, and O_2 With Molecular Oxygen. (In Russian.) V. M. Dukelskii and E. Ia. Zandberg. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 1, 1952, p. 33-36.

A laboratory study was made of the above. The procedure is described. Data are discussed, tabulated, and charted.

6109* Wetting of Solid Phases by Molten Silicates. (In Russian.) K. P. Azarov. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 1, 1952, p. 79-82.

The wetting of various oxides by a series of molten silicates was determined experimentally. Results are charted and briefly discussed.

6110* Absolute Heat of Wetting of Strontium, Lead, and Barium Sulfates by Water and Alcohol. (In Russian.) B. V. Ilin and V. F. Kiselev. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 1, 1952, p. 85-87.

Data on the above are tabulated and charted.

6111* Theory of Limiting Currents During the Reduction of Hydrogen Ions in Weak Acid Solutions. (In Russian.) S. G. Mairanovskii and M. B. Neiman. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 1, 1952, p. 93-96.

Presents a theoretical discussion of the above. Includes graphs and tables. 12 ref.

6112* Dependence of the Amount of Elastic Deformation of Oleogels on Rate of Deformation and Its Connection With Viscosimetric Properties. (In Russian.) A. A. Trapeznikov and V. A. Fedotova. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 1, 1952, p. 97-100.

A theoretical mathematical analysis.

6113* The Connection Between the Composition of Maximum Electroconductivity and the Eutectic Point in Salt-Water Systems. (In Russian.) M. A. Klochko. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 11, 1952, p. 261-264.

Experimental data from the author's laboratory as well as published data show that there is a close relationship between the compositions of maximum electroconductivity and the eutectic point of salt-water, acid-water, and hydroxide-water systems. Data are tabulated. 17 ref.

6114 The Crystal Structure of Cesium Chlorocuprate, Cs_2CuCl_4, and the Spectrum of the Chlorocuprate Ion. L. Helmholz and R. F. Kruh. *Journal of the American Chemical Society*, v. 74, Mar. 5, 1952, 1176-1181.

17 references.

6115* Tracer-Diffusion in Liquids. I. Diffusion of Tracer Amount of Sodium Ion in Aqueous Potassium Chloride Solutions. Jui Hsin Wang. *Journal of the American Chemical Society*, v. 74, Mar. 5, 1952, p. 1182-1186.

Describes method of measuring the diffusion of a tracer amount of radioactive ion in salt solutions. The diffusion coefficients of the tracer amount of radioactive Na in aqueous KCl solutions

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of concentration between 0.00494 and 4.14 formula weight per liter are determined.

6116 Heats of Reaction of Some Oxides of Americium and Praseodymium With Nitric Acid and an Estimate of the Potentials of the Am(III)—Am(IV) and Pr(III)—Pr(IV) Couples. L. Eyring, H. R. Lohr, and B. B. Cunningham. *Journal of the American Chemical Society*, v. 74, Mar. 5, 1952, p. 1186-1190.

15 references.

6117 Heats of Solution of Uranyl Nitrate Hydrates in Water and in Organic Solvents. Leonard I. Katzin, Dorothy M. Simon, and John R. Ferraro. *Journal of the American Chemical Society*, v. 74, Mar. 5, 1952, p. 1191-1194.

12 references.

6118 The Reduction of Nickel Oxide by Hydrogen. Giuseppe Parravano. *Journal of the American Chemical Society*, v. 74, Mar. 5, 1952, p. 1194-1198.

Above reaction was studied in the range 150-350°C. and initial pressures of H_2 of 200-500 mm. Addition of foreign ions to NiO affects both rate and activation energy for reduction. These effects are related to the change in electronic properties of the oxide. 13 ref.

6119 The Potential of the Electrocapillary Maximum of Mercury. II. D. C. Grahame, E. M. Coffin, J. I. Cummings, and M. A. Poth. *Journal of the American Chemical Society*, v. 74, Mar. 1952, p. 1207-1211.

Above was measured for a number of electrolytes in water solution. Seven methods were used in all, six of them new. Five of the methods were described in Part I; the other two are described here, together with improvements in one of those described earlier. The results are believed to be accurate to within a few tenths of a millivolt in favorable cases. Thermodynamic and kinetic significance of the results is discussed. 13 ref.

6120 The Separation of Titanium, Zirconium and Thorium by Ion Exchange. William E. Brown and William Rieman, III. *Journal of the American Chemical Society*, v. 74, Mar. 5, 1952, p. 1278-1282.

Describes method developed for the above. Radiochemical work with Ti^{51} showed that the radioactive isotopes was, to a certain extent, separated from the normal isotopes.

6121 Ion Aggregation in Gallium (III) Chloride Solutions Containing Added Alkali. Therald Moeller and Glendall L. King. *Journal of the American Chemical Society*, v. 74, Mar. 5, 1952, p. 1355-1356.

6122 Fluorine Exchange Reactions Between Hydrogen Fluoride and the Halogen Fluorides. Max T. Rogers and Joseph J. Katz. *Journal of the American Chemical Society*, v. 74, Mar. 20, 1952, p. 1375-1377.

Describes the above, using radioactive F^{18}, both the liquid and vapor phase in metal apparatus. Gives convenient methods for counting radioactive fluorine in the form of gaseous fluorides. 11 ref.

6123 Studies Relating to Boron. IV. π-Butylboron Chlorides. Robert B. Booth and Charles A. Kraus. *Journal of the American Chemical Society*, v. 74, Mar. 20, 1952, p. 1415-1417.

The preparation and some reactions of dibutylboron chloride and butylboron dichloride are described. A method is given for determination of B in the presence of interfering elements such as Ge.

6124 Studies Relating to Organic Germanium Derivatives. VI. Reactions of Sodium Triphenylgermanide With Organic Polyhalides in Liquid Ammonia and Diethyl Ether. Frank B. Smith and Charles A. Kraus. *Journal of the American Chemical Society*, v. 74, Mar. 20, 1952, p. 1418-1420.

6125 Reactions of Silane. I. The Alkylation and Alkoxylation of Silane. John S. Peake, W. H. Nebergall, and Yun Ti Chen. *Journal of the American Chemical Society*, v. 74, Mar. 20, 1952, p. 1526-1528.

23 references.

6126 Electronic Chemical Potential in Chemisorption and Catalysis. M. Boudart. *Journal of the American Chemical Society*, v. 74, Mar. 20, 1952, p. 1531-1535.

Presents a qualitative theoretical discussion of the above and considers the practical consequences. 40 ref.

6127 Solution of Boundary Spreading Equations for Electrophoresis and the Velocity Ultracentrifuge. Louis J. Gosting. *Journal of the American Chemical Society*, v. 74, Mar. 20, 1952, p. 1548-1552.

Presents the above relative to use with experimental data. This report is part of work planned for characterization of antigens and antibodies prior to the study of their interactions. Three-dimensional diagrams and 22 ref.

6128 Non-Exchange of Radiocyanide and Radiosulfide Ions With Aqueous Thiocyanate Ion. Arthur W. Adamson and Phillip S. Magee. *Journal of the American Chemical Society*, v. 74, Mar. 20, 1952, p. 1590.

Brief description of above study which yielded essentially negative results.

6129 Ultrasonic Velocity in Some Alkyl Aryl Ketones. R. T. Lagemann, B. F. Landrum, C. T. Lester, O. Milner, and E. G. McLeroy. *Journal of the American Chemical Society*, v. 74, Mar. 20, 1952, p. 1602-1603.

Brief account of further efforts to find what relationships exist between molecular structure and the velocity of ultrasonic waves in liquids. 11 ref.

6130 Equilibria Between Aliphatic Acids and a Strong Base Anion Exchanger. Sigfred Peterson and Robert W. Jeffers. *Journal of the American Chemical Society*, v. 74, Mar. 20, 1952, p. 1605-1606.

A note discussing the above as part of an investigation of ion-exchange behavior of carboxylic acids.

6131 Tracer-Diffusion in Liquids. II. The Self-Diffusion as Sodium Ion in Aqueous Sodium Chloride Solutions. Jui Hsin Wang and Sara Miller. **III. The Self-Diffusion of Chloride Ion in Aqueous Sodium Chloride Solutions.** Jui Hsin Wang. *Journal of the American Society*, v. 74, Mar. 20, 1952, p. 1611-1615.

Describes the above studies, based on a capillary method. Tables, graphs, 29 ref.

6132 The Use of Chlorine Trifluoride as a Fluorinating Agent. Eugene G. Rochow and Ira Kukin. *Journal of the American Chemical Society*, v. 74, Mar. 20, 1952, p. 1615-1616.

Presents a note on the above as a substitute for elementary fluorine. Apparatus diagram.

6133* Calculation of Adiabatic Decomposition Temperatures of Aqueous Hydrogen Peroxide Solutions. G. C. Williams and C. N. Satterfield. *Journal of the American Rocket Society*, v. 22, Mar.-Apr. 1952, p. 70-77.

The temperature and states attained on the fractional adiabatic decomposition of aqueous H_2O_2 solutions were calculated using the best available thermodynamic data. The technique of calculation is described and graphical presentations are given of temperature and liquid-vapor compositions as a function of fraction of H_2O_2 decomposed for several initial solution concentrations and at several pressures. 11 ref.

6134* Proton-Free Inorganic Ionizing Solvents. (In German.) H. Spandau and V. Gutmann. *Angewandte Chemie*, v. 64, Feb. 21, 1952, p. 93-103.

A large number of inorganic compounds have been used recently as ionizing solvents. The electrolytes dissolved in them are classed, in accordance with their behavior, as solvo-acids, solvo-bases, and solvo-salts. Their specific properties in contrast to water lead to new lines of development and to fundamental advantages in synthetic inorganic chemistry. Numerous references.

6135* Aluminum Oxides for Chromatographic Analysis and Attempts to Standardize Them. (In German.) G. Hesse, Irmgard Daniel, and G. Wohlleben. *Angewandte Chemie*, v. 64, Feb. 21, 1952, p. 103-107.

Characteristic values for the essential properties of chromatographic adsorbents and methods of measuring these values

are given. 3 types of Al_2O_3, whose properties are constant within close limits, were developed with the aid of these values.

6136* Rapid Testing of Ion Exchangers. (In German.) M. Zimmermann. *Angewandte Chemie*, v. 64, Feb. 21, 1952, p. 107-110.

The method described by H. Stach has been used successfully, with only slight alterations, for the past 6 yrs., in carrying out rapid comparative tests. Some of the more recent results are charted and tabulated.

6137* The Thermal Decomposition of Thorium Oxalate. Roberta Beckett and M. E. Winfield. *Australian Journal of Scientific Research*, ser. A, v. 4, Dec. 1951, p. 644-650.

Above was followed by determining weight loss, change in electrical conductivity, and chemical composition of products.

6138 The Conductances of Strong Solutions of Strong Electrolytes at 95°. A. N. Campbell and E. M. Kartzmark. *Canadian Journal of Chemistry*, v. 30, Feb. 1952, p. 128-134.

Measurements of conductance and fluidity of $AgNO_3$ and NH_4NO_3 solutions, over a range of concentrations, were made. Temperature coefficients of conductance and of fluidity are evaluated and their theoretical importance discussed.

6139 Note on the Preparation of Hydrazine by Arc Electrolysis in Liquid Ammonia. Thomas R. Ingraham. *Canadian Journal of Chemistry*, v. 30, Feb. 1952, p. 168.

Experiments made with d.c. discharges between a Pt electrode and a cathodic surface of liquid NH_3 showed that N_2H_4 may be recovered in yields up to 0.2% based on NH_3 disappearance. The product is pure, and the yield is a linear function of the quantity of electricity consumed in the electrolysis.

6140 Dielectric Behavior at the Second-Order Transitions in Chromium Sulphate, Chromium Nitrate, and Nickel Nitrate. H. Grayson-Smith and R. F. Sturrock. *Canadian Journal of Physics*, v. 30, Jan. 1952, p. 26-34.

Dielectric measurements were made at temperatures down to about 100°K. Apparatus is diagrammed; data are charted and discussed.

6141 Iodine as a Negative Catalyst; Some Applications of the Element & Its Compounds. *Chemical Age*, v. 65, Mar. 8, 1952, p. 377-379.

Discusses the mechanism of negative catalysis. Applications as antiknock agents, inhibiting coal-mine explosions, and production of crystals for infrared spectrographic analysis are surveyed.

6142 The Effect of Orientation and Shape on the Settling Velocity of Non-Isometric Particles in a Viscous Medium. John F. Heiss and James Coull. *Chemical Engineering Progress* (Engineering Section), v. 48, Mar. 1952, p. 133-140.

Al, Cr-alloy steel, and brass spheres were used in determining the viscosity of the fluids by the falling-sphere method. Data on the physical properties of these spheres are tabulated. 28 ref.

6143 Evaporation From Drops. Part I. W. E. Ranz and W. R. Marshall, Jr. *Chemical Engineering Progress* (Engineering Section), v. 48, Mar. 1952, p. 141-146.

An investigation was made of the factors influencing the rate of evaporation of pure liquid drops, and the rate of evaporation of water drops containing dissolved and suspended solids. The study was restricted to a Reynolds number range of 0-200, the range usually encountered in spray-drying operations. Independent correlations of heat- and mass-transfer rates were obtained from drop temperatures measured with 0.5 mil. thermocouples. Drop diameters ranged from 0.06 to 0.11 cm., and air temperatures ranged up to 220°C.

6144 Thermal Conductivity of Granular Solids Through Which Gases Are Flowing. Donald F. Molino and Joel O. Hougen. *Chemical Engineering Progress* (Engineering Section), v. 48, Mar. 1952, p. 147-149.

Presents results of above study; gives experimental technique and diagrams apparatus used. Results are graphed and tabulated.

6145 The Use of Benzene Adsorption Isotherms in Evaluating the Surface and Pore Characteristics of Activated Carbons. R. G. Davies. *Chemistry & Industry*, Feb. 23, 1952, p. 160-165.

Discusses experiments and results for the above. Includes tabulated data and graphs. 15 ref.

6146 The General Properties of Lyophilic Colloids. P. Johnson. *Chemistry & Industry*, Mar. 8, 1952, p. 206-210.

Discusses the above. Two of the most important properties of lyophilic as constrasted with lyophobic colloids are their sensitivity towards the addition or removal of electrolyte, and their spontaneous dispersion on addition of the dispersion medium to the disperse phase. Other properties are also considered. Illustrative data are tabulated and charted.

6147* Research on the Structure and Stability of Phases in the Fe_2O_3-Co_3O_4 System. (In French.) Jacques Robin and Jacques Bénard. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Feb. 11, 1952, p. 734-735.

Above properties were investigated at temperatures up to 1000°C. Spectrographic results are interpreted. Includes phase diagram.

6148* Standard Thermodynamic Properties of Copper Oxides. II. Activity of Copper in Its Alloys With Gold and Entropy of Cuprous Oxide. (In French.) Pierre Chiche. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Feb. 18, 1952, p. 830-832.

Results of investigation of the above are tabulated and discussed.

6149* Influence of the Heat Transformation of Solid Bodies on the Displacement of Their Transformation Temperature by Adsorbed Gases. (In French.) Jean-Pierre Kiehl. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Feb. 25, 1952, p. 943-945.

Results of investigation of the above for the hexagonal-cubic and reverse transformation of AgI and the γ-σ and reverse transformation of Na_2MoO_4 are charted and discussed. Results are believed to be generally applicable.

6150* Influence of the Disappearance of the Antiferromagnetism of Nickelous Oxide, NiO, on the Chemical Activity of This Oxide. (In French.) Georges Nury. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Feb. 25, 1952, p. 946-948.

The above was investigated, showing that the transformation from the antiferromagnetic state to the paramagnetic state tends to nullify the reactivity of divalent NiO between 300 and 400°C. Includes chart.

6151* Study of Electrolytic Phenomena With the Aid of Weak Alternating and Variable Frequency Currents. (In French.) Israël Epelboin. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Feb. 25, 1952, p. 950-952.

Variation of impedance of an electrolytic cell as a function of frequency was used to study electrode phenomena. In particular, there was noted a resonance related to the appearance of a diffusion layer around electrodes which are susceptible to selective dissolution. Characteristics of Ni and Pt electrodes in an acetic-perchloric acid bath were studied. Data are charted and discussed.

6152* Crystal-Structure Dimensions and Constitution of the Mixed Spinels γ-Fe_2O_3-Co_3O_4. (In French.) Jacques Robin and Jacques Bénard. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Feb. 25, 1952, p. 956-958.

Describes method of investigation. Results are charted and discussed.

6153* Separation of Phosphates, Phosphites, and Hypophosphites by Paper Chromatography. (In French.) André Bonnin and Pierre Süe. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Feb. 25, 1952, p. 960-961.

Results of investigation of the above, conducted to determine the chemical forms of radiophosphorus formed in certain nuclear reactions, are tabulated and discussed.

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6154 The Mechanism of the Cathodic Hydrogen Evolution Reaction. J. O'M. Bockris and E. C. Potter. *Journal of the Electrochemical Society*, v. 99, Apr. 1952, p. 169-186.

Some of the outstanding problems of concept and mechanism in the field of cathodic-hydrogen evolution kinetics are discussed and clarified. A full derivation and correlation of kinetic equations, assuming no mechanism, reveals expressions for several parameters which take values specific to one or more mechanisms. Includes discussion of specific mechanisms for Hg, Ag, Ni, and Pt cathodes. 27 ref.

6155* The Aggregation of Oil Particles in Emulsions. E. G. Cockbain. *Transactions of the Faraday Society*, v. 48, Feb. 1952, p. 185-196.

The reversible aggregation and disaggregation of oil particles (benzene or paraffin hydrocarbons) in soap-stabilized emulsions was studied employing rate-of-creaming data as the chief criterion of aggregation. In all the systems examined, aggregation of the oil particles commences at a soap concentration equal to or a little greater than, the critical micellar concentration of the soap. Graphs and tables. 16 ref.

6156* Interferometric Recording of Refractive Index Gradients. 7. Report on Electrophoresis. (In German.) E. Wiedemann. *Helvetica Chimica Acta*, v. 35, Feb. 1, 1952, p. 82-92.

Reviews methods for the above in solutions on the basis of the literature. Describes in particular optical arrangements based on the Rayleigh principles; and a modification of this arrangement which makes possible its application to small apparatus similar to that of Tiselius. Advantages of these techniques are indicated. 35 ref.

6157* Crystal Structure Determination of Monoclinic, Basic Copper Nitrate, $Cu_4(NO_3)_2(OH)_6$. II. (In German.) W. Nowacki and R. Scheidegger. *Helvetica Chimica Acta*, v. 35, Feb. 1, 1952, p. 375-390.

The above was determined by means of Patterson, trial-and-error, and Fourier methods. Lattice constants, space group, and atomic coordinates are tabulated. 42 ref.

6158* The Ageing of Bordeaux Mixture. G. Narayan and B. Sanjiva Rao. *Proceedings of the Indian Academy of Sciences*, v. 34, sec. A, Dec. 1951, p. 391-395.

Bordeaux mixture prepared at room temperature contains a high initial concentration of Cu in the aqueous phase. On keeping the mixture at 24°C., the Cu content of the solution decreases. The changes in Cu concentration of the aqueous phase are due to aging of the precipitate. Experiments conducted at 0 and at 70°C. show that an increase in temperature markedly promotes aging.

6159 Production of Pure Rare Earth Metals. Frank H. Spedding, Harley A. Wilhelm, Wayne H. Keller, Donald H. Ahmann, Adrian H. Daane, Clifford C. Hach, and Robert P. Ericson. *Industrial and Engineering Chemistry*, v. 44, Mar. 1952, p. 553-556.

A method for the above was devised in which anhydrous rare-earth chlorides are reduced by Ca in refractory oxide-lined containers. Vacuum remelting removes all but trace amounts of Ca. La, Ce, Pr, Cb have been produced purer than 99.7%. 25 ref.

6160 Static Sorption Isotherm for Beta-Soluble Anhydrite and Humid Air. Stanley H. Jury and William Licht, Jr. *Industrial and Engineering Chemistry*, v. 44, Mar. 1952, p. 591-594.

The above was studied in order to make available data necessary in subsequent studies of the kinetic mechanism by which moisture is sorbed. 17 ref.

6161* Studies on Synthetic Ammonia Catalyst. (In Japanese.) **V. On the Adsorption of Hydrogen by the Catalysts in Use and of Carbon Dioxide and Hydrogen by Catalysts Promoted by Al_2O_3, K_2O, and CaO.** Hiroshi Uchida and Toshio Sata. **VI. Relation Between the Change of Conversion Efficiencies With Increase in Pressure and Kinds of Promoters.** Hiroshi Uchida and Kiyoshi Ogawa. **VII. Change of Pore Size Distribution With Type of Promoters.** Hiroshi Uchida and Minoru Kurita. **VIII. Resistivity to Carbon Monoxide Poisoning of Catalysts With Different Promoters.** Hiroshi Uchida and Naoyuki Todo. *Reports of the Government Chemical Industrial Research Institute, Tokyo*, May 1951, p. 103-124; June 1951, p. 173-187; July 1951, p. 213-224.

61 references.

6162* Studies on the Hydrolysis of Sodium Aluminate Solution. On the Viscosity of Sodium Aluminate Solutions. (In Japanese.) Taichi Sato. *Reports of the Government Chemical Industrial Research Institute, Tokyo*, v. 46, June 1951, p. 147-152.

Viscosities of various concentrations of sodium aluminate solutions were measured. Arrhenius' empirical formula was found to apply to the relationship between viscosity and alumina concentration.

6163* Problems in Design and Research on Condensers of Vapours and Vapour Mixtures. Allan P. Colburn. *Institution of Mechanical Engineers, Proceedings*, v. 164, no. 4, 1951, p. 448-458.

The basic theory underlying condensation of pure and mixed vapors was developed, and heat and mass transfer rates were established for simple shapes. Considerably more attention needs to be given to methods of utilizing this information in design, both for accurate and approximate answers. 36 ref.

6164* Experimental Verification of the Statistical Theory of Poisoning. Report I. Poisoning of Nickelous Oxide by Boric Acid. (In Russian.) S. Z. Roginskii and N. I. Element. *Izvestiia Akademii Nauk SSSR*, Section of Chemical Sciences, July-Aug. 1951, p. 350-360.

A study was made of the above. Isotherms for the poisoning action are presented. The rate of the process was also studied. Data are charted and discussed.

6165* Catalytic Activity and Structure of Active Zinc Oxide. Report III. Influence of Method of Preparation of Zinc Oxide Catalysts on Their X-Ray Structure. (In Russian.) A. B. Shekhter, M. Ia. Kushnerev, and Iu. Sh. Moshkovskii. *Izvestiia Akademii Nauk SSSR*, Section of Chemical Sciences, July-Aug. 1951, p. 388-394.

6166* The Problem of the Determination of Volume Concentration During Filtration of Suspensions. (In Russian.) Iu. M. Shekhtman. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, June 1951, p. 839-843.

Presents mathematical development of above problem. Data for a typical example are tabulated and charted.

6167* The Correlation of Slot-Opening With Flow Rate for Air Bubbling Into Water. C. A. Cross and H. Ryder. *Journal of Applied Chemistry*, v. 2, Feb. 1952, p. 51-60.

When air flows through a slot in a vertical diaphragm into a tank full of water, the level on the air-inlet side is depressed below the apex of the slot. This depression, defined as "slot-opening," was correlated with air rate. Some 300 determinations were made at air rates between 0.01 and 800 cu. ft. per min. for one rectangular and one triangular slot. A few further measurements were made with slots of varied dimensions. All these measurements are shown to fit the simple hydrodynamic theory modified to take account of surface-tension effects. Application to bubble-plate distillation-column theory and practice is indicated. 10 ref.

6168* An Improved Automatic Mercury-Distillation Apparatus. S. G. Yorke. *Journal of Applied Chemistry*, v. 2, Feb. 1952, p. 77-79.

A vacuum mercury still is described and diagrammed. Its operation is unaffected by normal changes of atmospheric pressure.

6169 An Investigation of Certain Solvent Effects in Absorption Spectra. Arthur L. LeRosen and Charles E. Reid. *Journal of Chemical Physics*, v. 20, Feb. 1952, p. 233-236.

A study of solvent effects in spectra of non-ionic compounds to whose structure a zwitter-ion form makes appreciable contribution (particularly in the excited state) revealed 3 distinct effects: shift of absorption bands to greater wavelength with increasing refractive index, as predicted by Kundt's rule; further shift which appears with most solvents other than hydro-

carbons and aryl halides, and is ascribed to orientation of molecules of nonuniform polarizability; and the Kuhn-Brockmann effect—a large shift which appears whenever hydrogen bonds between the solvent and solute occur. 14 ref.

6170 Photochemical Oxidation-Reduction and Photocatalysis. The Photochemical Activity of $FeCl_4^-$ in Alcohol as Oxidizing Agent and as Catalyst. G. J. Brealey and Norbert Uri. *Journal of Chemical Physics*, v. 20, Feb. 1952, p. 257-262.

18 references.

6171 The Physical Properties of Molecules in Relation to Their Structure. I. Relations Between Additive Molecular Properties in Several Homologous Series. H. J. Bernstein. *Journal of Chemical Physics*, v. 20, Feb. 1952, p. 263-269.

Relations between additive physical properties of the substituted methanes, ethanes, ethylenes, benzenes, and acyclic saturated hydrocarbons were derived, assuming strict additivity for the contributions from non-bonded atoms, as well as for the contributions from bonded atoms. 18 ref.

6172 The Prediction of Thermodynamic Properties of Nonideal Solutions From Turbidity Measurements. A. L. Babb and H. G. Drickamer. *Journal of Chemical Physics*, v. 20, Feb. 1952, p. 290-293.

Turbidity measurements were made on 3 systems, near the critical solution temperature at 7 atm. pressure and also at a considerably higher pressure. Effect of pressure is to elevate the critical solution temperature and to decrease the minimum transmission. The wave-length dependence is consistent with the theory of Ornstein and Zernike. The change of fugacity with concentration is calculated as a function of temperature, pressure, and composition. Apparatus is described and diagrammed.

6173 The Heat of Dissociation of Fluorine. Russell N. Doescher. *Journal of Chemical Physics*, v. 20, Feb. 1952, p. 330-334.

Equilibrium pressure measurements of the dissociation of F_2 were completed using a nickel vessel coated stepwise by heating in contact with F_2 at temperatures up to 850°C., and a differentially applied manometer containing a fluorinated oil. The latter technique made it possible to carry out the measurements in the range 759-1115°K. 15 ref.

6174 Ferroelectric Transitions and Heterogenous Catalysis. G. Parravano. *Journal of Chemical Physics*, v. 20, Feb. 1952, p. 342-343.

Outlines some results obtained in connection with catalytic oxidation of CO on several ferroelectric substances. Concludes that rate of the oxidation is affected by ferroelectric transitions occurring in sodium and potassium columbates and lanthanum ferrite.

6175 Comparison of Absorption Spectrum of Uranium Tetrachloride With That of Praseodymium Trichloride and of Uranium Trichloride With That of Neodymium Trichloride. Kenneth M. Sancier and Simon Freed. *Journal of Chemical Physics*, v. 20, Mar. 1952, p. 349-351.

6176 Kinetics of a Fixed Bed System for Solid Diffusion Into Spherical Particles. J. B. Rosen. *Journal of Chemical Physics*, v. 20, Mar. 1952, p. 387-394.

A solution is presented for the general problem of the transient behavior of a linear fixed-bed system where rate of adsorption is determined by the combined effect of a liquid film and solid diffusion into spherical particles. The result is given in two forms; an exact solution and an approximation. 10 ref.

6177 Diffusion Coefficients of the Systems CO_2-CO_2 and CO_2-N_2O. I. Amdur, J. W. Irvine, Jr., E. A. Mason, and J. Ross. *Journal of Chemical Physics*, v. 20, Mar. 1952, p. 436-443.

$C^{14}O_2$ was used to measure diffusion coefficients for above systems in the range −78 to 90°C. The apparatus, which is of the Loschmidt type, uses saturation ironization currents as a measure of extent of diffusion. Characteristics of this type of apparatus are analyzed in detail to obtain working equations which permit use of experimental measurements at both small and large values of time. The present results agree with those obtained by other investigators using different experimental methods. 21 ref.

6178 The Molecular Structure of MoF_6, WF_6, and UF_6 From Infrared and Raman Spectra. T. G. Burke, D. F. Smith, and A. H. Nielsen. *Journal of Chemical Physics*, v. 20, Mar. 1952, p. 447-454.

Reports on complete investigation and interpretation of Raman and infrared spectra of MoF_6, WF_6, and UF_6. 10 ref.

6179 Substituted Methanes. VIII. Vibrational Spectra, Potential Constants, and Calculated Thermodynamic Properties for Dibromodichloromethane. Abram Davis, Forrest F. Cleveland, and Arnold G. Meister. *Journal of Chemical Physics*, v. 20, Mar. 1952, p. 454-459.

16 references.

6180 Thermal Conductivity of Fluid Argon and Nitrogen. Arthur Uhlir, Jr. *Journal of Chemical Physics*, v. 20, Mar. 1952, p. 463-472.

Above were measured at pressures up to twice the critical pressures and at temperatures from the normal boiling points to well above the critical temperatures. By combining Enskog's transport theory for a dense gas of hard elastic spheres with free-volume calculations for a close-packed lattice, thermal conductivity of liquid argon is calculated between 87.3 and 141.6°K from liquid and vapor densities and entropy of vaporization. The values so calculated are within 15% of measured values. However, a similarly calculated value of viscosity is 50% lower than the experimental value. A correction for quantum-mechanical effects reduces the disagreement to about ±5%, which is within the uncertainty of the thermodynamic data. 36 ref.

6181 Infrared and Raman Spectra of Fluorinated Ethanes. III. The Series CH_3-CF_3, CH_2-CF_2Cl, CH_3-$CFCl_2$ and CH_3-CCl_3. D. C. Smith and George M. Brown. *Journal of Chemical Physics*, v. 20, Mar. 1952, p. 473-486.

17 references.

6182 The Surface Adsorption of Small Ions in Solutions of Surface-Active Agents. Charles M. Judson, Ann A. Lerew, J. K. Dixon, and D. J. Salley. *Journal of Chemical Physics*, v. 20, Mar. 1952, p. 519-520.

The adsorption of Na ions from solutions of Aerosol OTN, labeled with $Na^{22}Cl$, was measured using Hutchinson's method. Results are charted and discussed.

6183 Relations Between Activation Energy, Rate of Reaction, Bond Dissociation Energy, and Heats of Formation, Atomization, and Reaction for the Substituted Methanes. H. J. Bernstein. *Journal of Chemical Physics*, v. 20, Mar. 1952, p. 524.

Theoretical analysis.

6184* Role of Oxidized Radicals in Oxidations and Reductions Produced by Ionized Radiations. IV. Chromium Chromate — Chromium Sulfate System. (In French.) M. Lefort, P. Radhakrishna, and M. Haissinsky. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 48, Nov.-Dec. 1951, p. 485-488.

Irradiation of solutions of Cr^{VI} or Cr^{III} by α-rays leads to results similar to those observed by adding H_2O_2: reduction in an acid solution and weak oxidation in an alkaline solution. The amounts of O_2 and H_2 produced by irradiation of bichromate in an acid solution by X-rays are much higher than obtained by ordinary reduction. Includes graphs.

6185* Isotopic Exchanges in the Iodate-Periodate-Iodine System. (In French.) M. Cottin, M. Haissinsky, and D. Peschanski. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 48, Nov.-Dec. 1951, p. 500.

Briefly discusses some recent publications on the above.

6186 Adsorption of Vapors by Silica Gels of Different Structures. F. E. Bartell and John E. Bower. *Journal of Colloid Science*, v. 7, Feb. 1952, p. 80-93.

Isothermals were obtained at 25°C. for adsorption of the vapors of methyl alcohol, ethyl alcohol, propyl alcohol, benzene, carbon tetrachloride, hexane, and water by silica gels of different apparent densities. For certain of these systems, additional isotherms at 40 or 45°C. were obtained. Specific surface area of each gel was determined by 3 independent methods. For each system, values of adhesion tension, work of ad-

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hesion, and initial spreading coefficient were calculated from the adsorption data. 21 ref.

6187 Force Constants in Hydrogen and Deuterium Peroxides. Paul A. Giguere and Osias Bain. *Journal of Physical Chemistry*, v. 56, Mar. 1952, p. 340-342.

Infrared spectrum of H_2O_2 was re-examined and that of D_2O_2 measured for the first time in the vapor state. 18 ref.

6188 Remarks on the Structures of the Volatile Fluorides. S. H. Bauer. *Journal of Physical Chemistry*, v. 56, Mar. 1952, p. 343-351.

Reviews above, and presents electron-diffraction data on several compounds not previously investigated. Discusses the conflicting conclusions that have been reached by diffraction and spectroscope techniques. 81 ref.

6189 The Physical Properties of Molecules in Relation to Their Structure. IV. Bond Distance Relations in the Substituted Methanes and Acyclic Aliphatic Hydrocarbons. H. J. Bernstein. *Journal of Physical Chemistry*, v. 56, Mar. 1952, p. 351-355.

23 references.

6190 Study by Raman Effect of the Ge-H Bond in $GeHX_3$ Molecules and of the Mobility of the Halogen Bond in Halogenated Derivatives of the Carbon Family. Marie-Louise Delwaulle. *Journal of Physical Chemistry*, v. 56, Mar. 1952, p. 355-357.

Discusses the above. Claims the existence of the hitherto-denied Ge-H covalent bond. 14 ref.

6191 The Dissociation Energy of Fluorine. E. Wicke. *Journal of Physical Chemistry*, v. 56, Mar. 1952, p. 358-360.

Gives methods and results of tests to determine above; and indicates probable range within which above value lies. 13 ref.

6192 Approximate Adsorption Isotherms for a Mixture of Two Isotopes. William Band and Earle B. Emery. *Journal of Physical Chemistry*, v. 56, Mar. 1952, p. 384-388.

Generalizes the B.E.T. theory of multimolecular adsorption to include the above case. An expression is obtained for the adsorption isotherm which is useful in the case of adsorption of He isotopes. Results are illustrated graphically.

6193 The Effect of Heat Treatment on the Surface Properties of Gibbsite. Part III. The Chemical Nature of the Products Formed. S. J. Gregg and K. S. W. Sing. *Journal of Physical Chemistry*, v. 56, Mar. 1952, p. 388-391.

Samples of gibbsite were heated for 5 hrs. at a succession of fixed temperatures, and the product examined by X-rays and by measurements of volatile matter, specific gravity, and bulk density. Results show that from 300 to 500°C., the product is a mixture of boehmite and γ-alumina, from 500 to 1000°C. is γ-alumina of crystallite size progressively diminishing as temperature rises, and at 1200°C. is corundum. 17 ref.

6194 Competitive Adsorption From Solution Between Hydrophobic and Hydrophilic Molecules and Ions. R. L. Merker and W. A. Zisman. *Journal of Physical Chemistry*, v. 56, Mar. 1952, p. 399-404.

Discusses the above with reference to Pt foil and effects of varying pH, dissociation constant, and concentration. Generalizes results to include other unreactive metals; and extends usefulness to corrosion inhibition, electrode phenomena, and aqueous lubricants. 15 ref.

6195* The Adsorption of Hydrophobic Monolayers of Carboxylic Acids. Hayward R. Baker, Elaine G. Shafrin, and William A. Zisman. *Journal of Physical Chemistry*, v. 56, Mar. 1952, p. 405-412.

The adsorption technique reported previously was successfully extended to the study of monolayers physically adsorbed onto Pt from aqueous solutions of a variety of mono and dicarboxylic acids. A new "thermal-gradient method" for using a pure, molten compound was found by which adsorbed, close-packed monolayers can be prepared and isolated on metal in the absence of solvent. 18 ref.

6196 Surface Hydrolysis in Sodium Lauryl Sulfate Solutions and Its Effect on Surface Tension and on Adsorption at the Solid-Aqueous Solution Interface. Melvin A. Cook and Eugene L. Talbot. *Journal of Physical Chemistry*, v. 56, Mar. 1952, p. 412-416.

16 references.

6197* Liquid-Liquid Junction Potentials of Some Solutions of Copper Salts at Different Temperatures. (In French.) M. Bonnemay and J. Fairbank. *Journal des Recherches du Centre National de la Recherche Scientifique*, Dec. 1951, p. 66-68.

Describes theoretical considerations. Experimental data are tabulated.

6198* The Practical Possibilities of Ion Exchange. Part I. The Separation of Ions. T. R. E. Kressman. *Manufacturing Chemist and Manufacturing Perfumer*, v. 23, Mar. 1952, p. 93-95, 98.

A review. 41 ref.

6199* Contribution to Knowledge Concerning Basic Alkali Sulfates and Selenates. (In German.) F. Windmaisser and F. Stöckl. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 83, Feb. 15, 1952, p. 151-153.

Results of experiments are briefly tabulated and discussed.

6200* Antimony Tetroxide. (Solubility; Oxidation Levels in Solution.) (In German.) N. Konopik and J. Zwiauer. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 83, Feb. 15, 1952, p. 189-196.

Reviews literature on the above. Presents results of experimental investigation, using water and acid and alkali solutions of different concentrations.

6201* Quantitative Evaluation of Electrophoresis Diagrams on Filter Paper Part II. (In German.) H. Michl. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 83, Feb. 15, 1952, p. 210-220.

Discusses 4 previously described methods for the above. Describes a simple, continuous, self-registering process; and presents a comprehensive treatment of problems involved. 25 ref.

6202 Calculation of Surface Areas From Room-Temperature Adsorption Isotherms. N. Berkowitz and H. G. Schein. *Nature*, v. 169, Mar. 1, 1952, p. 373.

Provides evidence that the application of the BET method to room-temperature isotherms is in certain instances liable to lead to substantial errors. The adsorption of methanol on lignites at 25°C. presents a case in point.

6203 Anion Affinity and Polarizing Power of Cations. L. H. Ahrens. *Nature*, v. 169, Mar. 15, 1952, p. 463.

Suggests that ionization potential be used as a relative measure of the power of a cation to attract an anion, and of its polarizing power.

6204 Reaction Velocities and Activation Energies of Some "Instantaneous" Complex Ion Reactions. Jannik Bjerrum and Knud Georg Poulsen. *Nature*, v. 169, Mar. 15, 1952, p. 463-464.

Describes experiments on the above which support qualitatively the idea of a connection between rates of complex formation and valency and electron configurations of the metals in the transition series. Some systems were more thoroughly examined, and the times necessary for reaching a certain degree of reaction determined at different temperatures.

6205 Thermodynamics of Three-Component Systems. H. A. C. McKay. *Nature*, v. 169, Mar. 15, 1952, p. 464-465.

Theoretical, mathematical analysis. New approach is applied to aqueous solutions of two electrolytes, partition equilibria, and ion-exchange equilibria.

6206* The Growth of Cadmium Iodide Crystals. I. Dislocations and Spiral Growth. A. J. Forty. *Philosophical Magazine*, ser. 7, v. 43, Jan. 1952, p. 72-81.

Evidence is given that CdI_2 crystals grow from a low degree of supersaturation by a dislocation mechanism. Sequences of photographs illustrate the stages in the growth of the crystal

plates. The screw dislocations are not simple, but are groups of simple dislocations. The kinking of step-lines is explained by the interaction of screw-dislocation groups of different strengths. The properties of large screw dislocation groups in the crystal plates are discussed.

6207* Anamalous Paramagnetism and Exchange Interaction in Copper Acetate. B. Bleaney and K. D. Bowers. *Philosophical Magazine*, ser. 7, v. 43, Mar. 1952, p. 372-374.

Presents results of investigation on the above, and their interpretation. Measurements were made principally at 90°K.

6208* The Experimental Determination of the Equation of State Data of Gases at Temperatures Between 0°C and —180°C. (In English.) A. Michels, T. Wassenaar, and Th. N. Zwietering. *Physica*, v. 18, Jan. 1952, p. 67-74.

A new method for the above is described. It is based essentially on measurement of isochores for a series of densities by use of a new type of a differential manometer. These densities are computed from known data of state above room temperature. Measurements on air were carried out in the range from 0 to −155°C. Reproducibility was of the order 1:10,000.

6209* Isotherms and Thermodynamic Functions of Methyl Fluoride at Temperatures Between 0°C and 150°C and at Pressures up to 150 Atmospheres. (In English.) A. Michels, A. Visser, R. J. Lunbeck and G. J. Wolkers. *Physica*, v. 18, Feb. 1952, p. 114-120.

6210* Isotherms of Carbon Monoxide Between 0°C and 150°C and at Pressures up to 3000 Atmospheres. (In English.) A. Michels, J. M. Lupton, T. Wassenaar, and W. DeGraaff. *Physica*, v. 18, Feb. 1952, p. 121-127.

12 references.

6211* Thermodynamic Properties of Carbon Monoxide at Temperatures Between 0°C and 150°C and at Densities up to 600 Amagat. (In English.) A. Michels, R. J. Lunbeck, and G. J. Wolkers. *Physica*, v. 18, Feb. 1952, p. 128-134.

Presents calculated values for energy, entropy, kinetic energy, free energy, enthalpy, free enthalpy, and specific heat.

6212 Fission Neutron Spectrum of U^{235}. Norris Nereson. *Physical Review*, ser. 2, v. 85, Feb. 15, 1952, p. 600-603.

The energy distribution of neutrons (prompt and delayed) arising from thermal fission of U^{235} was studied with nuclear plates. The data extend over the range from 0.4 to 7 Mev.

6213* Viscosity of Binary Liquid Mixtures. (In English.) N. L. Balazs. *Recueil des Travaux Chimiques des Pays-Bas*, v. 70, May 1951, p. 412-418.

An approximate theoretical deduction is given for the viscosity coefficient of binary liquid mixtures, combining a modified theory of Eyring for viscous flow with the statistical model due to Guggenheim for strictly regular solutions, using the Bragg-Williams approximation. 14 ref.

6214* Separation of Thorium From Uranium. (In English). K. V. S. Krishnamurty and Bh. S. V. Raghava Rao. *Recueil des Travaux Chimiques des Pays-Bas*, v. 70, May 1951, p. 421-424.

Anisic acid was found to be a suitable reagent for the separation of Th from U. From neutral solutions, Th may be freed from twice its quantity of U in a single precipitation and from about 8 times as much U after a second precipitation.

6215* Gradual Separation and Economy. VI. Separation by Distillation in Batches. (In English.) J. P. Treub. *Recueil des Travaux Chimiques des Pays-Bas*, v. 70, Dec. 1951, p. 1093-1098.

A diagram is developed for determing the number of distillation elements necessary in fractionating columns for various purities of distillate and residue and for various types of binary systems in distilling with total reflux and with central introduction of intermediates. An example of use of the diagram is given.

6216* Spectrographic and Thermogravimetric Study of Some Antimoniates. (In French.) Thérèse Dupuis. *Recueil des Travaux Chimiques des Pays-Bas*, v. 71, Jan. 1952, p. 111-119.

Presents results of study of antimoniates of K, Na, Ba, Ag, and Pb, in the solid state, in the cold, and after thermal dehydration. Gives infrared spectra between 600 and 2000 A. and thermographic curves between 20 and 1000°C.

6217* Decomposition of Hydrogen Peroxide in Water Enriched in Heavy Oxygen. C. A. Bunton and D. R. Llewellyn. *Research*, v. 5, Mar. 1952, p. 142-143.

Above was investigated in the presence of various reagents which either catalyze this decomposition or react chemically with H_2O_2.

6218* Cryoscopy at High Temperature. (In French.) Georges Petit. *Revue Générale des Sciences pures et appliquées*, v. 58, nos. 11-12, 1951, p. 324-340.

High-temperature cryoscopy applies classical techniques and theories to the problems of molten-salt solutions. Shows relationship to aqueous salt solutions, and application to electrochemistry and electrometallurgy. (To be continued.)

6219 The Action of X-Rays on Ferrous and Ferric Salts in Aqueous Solutions. T. Riggs, G. Stein, and J. Weiss. *Proceedings of the Royal Society*, v. 211, sec. A, Mar. 6, 1952, p. 375-398.

The influence on the above of concentration of iron salt (ferrous and ferric), dependence on pH, influence of complex-forming substances, and effect of different dissolved gases (oxygen, hydrogen) were studied in detail; and an attempt was made to find a scheme for the reaction mechanism, and to obtain the value of the absolute chemical yield in terms of energy absorbed. Graphs and 42 ref.

6220 The Formation of an Aerosol by Condensation of a Dilute Vapour in a Carrier Gas. J. Corner. *Proceedings of the Royal Society*, v. 211, sec. A, Mar. 6, 1952, p. 417-430.

Above is examined theoretically. An approximate solution was obtained which shows how the average particle size depends on rate of cooling and time of quenching. Graphs and 17 ref.

6221* Francium: Element 87. (In French.) Marguerite Perey. *Bulletin de la Société Chimique de France*, Nov.-Dec. 1951, p. 779-785.

1.2% of Ac atoms disintegrate by emission of a α-radiation to give AcK. This natural radioelement is the only natural isotope known of element 87, to which the name francium is given. Discusses its discovery, radioactive and chemical properties, and applications. Includes graphs, charts, and tables. 35 ref.

6222* Procedure for Measurement of Conductivities in Order to Determine the Concentrations of Solutions. (In French.) J. Gilbert. *Bulletin de la Société Chimique de France*, Nov.-Dec. 1951, p. 882-890.

Discusses a new type of cell having the following properties: the "vessel constant" is independent of concentration; a precision of 0.5% can be obtained with cells requiring only 6 cc. of liquid; and homogeneization of the liquid is readily obtained without stirring. Optimum concentration corresponds to a conductivity of 1000 mhos. per cm. Includes tables and graphs.

6223* May Cyrstals Be Isotropic and Anisotropic Simultaneously? (In Russian.) A. V. Shubnikov. *Uspekhi Fizicheskikh Nauk*, v. 44, May 1951, p. 3-6.

The possibilities of crystals having one type of symmetry for some properties and another type for other properties is discussed.

6224* An Experimental Investigation of the Structure of Atoms in Crystals. (In Russian.) S. T. Konobeevskii. *Uspekhi Fizicheskikh Nauk*, v. 44, May 1951, p. 21-32.

Data from X-ray studies were used to calculate the possibility of the existence of atoms as such in crystals. Aluminum and diamond crystals were investigated. Data are tabulated and charted.

6225* The Influence of Small Additions on the Activity of Catalysts. (In Russian.) G. M. Zhabrova. *Uspekhi Khimii*, v. 20, July-Aug. 1951, p. 450-472.

Presents a detailed discussion of the influence of various intensifiers on catalysts used for a series of reactions. Data are tabulated and charted. 72 ref.

6226 Evaporation of Silica. A. de Rudnay. *Vacuum*, v. 1, July 1951, p. 204-205.

Outlines results and conclusions based on work of the author in his Austrian laboratory.

26. *Chemistry—General, Inorganic, and Physical*

6227* Electrochemical Conference. *Vestnik Akademii Nauk SSSR*, v. 21, June 1951, p. 112-117.

A report on a conference on electrochemical developments in Russia. Many projects and the principal workers are mentioned.

6228* Thermodynamics of Irreversible Processes. (In French.) Kyrille Popoff. *Zeitschrift für angewandte Mathematik und Physik*, v. 3, Jan. 15, 1952, p. 42-51.

6229* Electrochemistry of Finely Porous Capillary Systems. V. Flow Potentials. Donnan Obstruction of Flow of Electrolyte. (In German.) Gerhard Schmid and Hans Schwarz. *Zeitschrift für Elektrochemie Berichte der Bunsengesellchaft für Physikalische Chemie*, v. 56, Jan. 1952, p. 35-44.

Discusses flow potential and electric blocking effect (Donnan obstruction) from the standpoint of electrochemical theory of fine-pored capillary systems. It is shown that in ideal dilution and pore size, reduction of concentration of solution forced through a membrane is proportional to reduction of its conductivity. Data are graphed and tabulated .

6230* Concentration Variation of Thermodynamic Functions of Dilute Binary Nonelectrolytic Solutions. (In German.) Rolf Haase. *Zeitschrift für Elektrochemie Berichte der Bunsengesellschaft für Physikalische Chemie*, v. 56, Jan. 1952, p. 51-54.

A theoretical, mathematical analysis.

6231* Conductivity and diffusion in the Gaseous Phase. V. Computing the Coefficient of Thermal Conductivity Relation Between the So-Called Viscosity and Thermal Conductivity Coefficients. (In German.) Leonid Andrussow. *Zeitschrift für Elektrochemie Berichte der Bunsengesellschaft für Physikalische Chemie*, v. 56, Jan. 1952, p. 54-58.

Theoretical, mathematical analysis of the above includes a collection of tabular data for a series of simple gases and organic vapors.

6232* Anomalous Solid Solutions in the Cerium Dioxide —Uranium Oxide System. (In German.) F. Hund, R. Wagner, and U. Peetz. *Zeitschrift für Elektrochemie Berichte der Bunsengesellschaft für Physikalische Chemie*, v. 56, Jan. 1952, p. 61-65.

Describes preparation of above oxides, shows that the system with 0-63 mol. % UO_2 has a fluorite phase, and explains experimental and mathematical determination of densities at 25°C. Solid solutions were found to have complete cation lattices with a possible excess of oxygen in the interlattice spaces. Data are graphed and tabulated. 19 ref.

6233* Thermal Analysis of the Systems K_2MoO_4-MoO_3, Rb_2MoO_4-MoO_3 and Cs_2MoO_4-MoO_3. (In Russian.) Vikt. I. Spitsyn and I. M. Kuleshov. *Zhurnal Obshchei Khimii*, v. 21(83), Aug. 1951, p. 1365-1374.

Data on the above are tabulated, charted, and discussed.

6234* Reduction of Silicotungstates by Hydrogen. III. Reduction of Unsaturated Potassium Silicotungstate. (In Russian.) E. A. Nikitina and A. S. Kokurina. *Zhurnal Obshchei Khimii*, v. 21(83), Aug. 1951, p. 1395-1405.

The above was studied by means of X-rays. Data are tabulated and charted. Typical diffraction patterns are reproduced.

6235* Surface Energy of Molecules and Their Physicochemical Properties. VI. Diameter of the Molecules, Surface Energy, and the Constant *a* of the Van der Waals Equation. (In Russian.) S. G. Morushin. *Zhurnal Obshchei Khimii*, v. 21(83), Aug. 1951, p. 1405-1408.

The above is discussed and various calculations are compared.

Miscellaneous Publications

6236 Acid-Base Adsorption Processes. Part I. Free Acid and Base Absorption on Solids From Aqueous Solutions of Strong Electrolytes. Part II. Theory of Adsorption on Ion-Exchange Resins. Milton E. Wadsworth and Melvin A. Cook. Engineering Experiment Station, University of Utah, v. 41, Bulletin 51, July 1951, 20 pages. (TA21 Ut1b)

Presents results of experimental and theoretical studies.

6237 Fixation of Hydroxides by Montmorillonite. (In French.) J. Longuet-Escard. *Fourth International Congress of Soil Science, Transactions*, v. 3, 1950, p. 40-44. (S590 I8t4)

Specifies conditions for formation of complexes of the chlorite type by precipitation with NH_3, in a dilute mixture of different hydroxides, upon the flakes of montmorillonite in order to approach as much possible conditions of reversibility. Methods for obtaining mixed complexes were also studied.

Books

6238 Structural Chemistry of Inorganic Compounds. Vol. II. Walter Hückel. 1094 pages. 1951. Elsevier Publishing Co., New York. (QD151 H86str.)

A comprehensive and detailed treatment of the above. Chapter references.

6239 Physical Properties and Analysis of Heavy Water. Isidor Kirshenbaum. 438 pages. 1951. McGraw-Hill, New York. (QD181.H1 K63p)

The physical properties of heavy water are discussed in Chap. 1. Chap. 2 covers chemical equilibriums or exchange reactions, which are of considerable importance in the general problem of isotope separation and are of fundamental interest in chemical thermodynamics. Remaining chapters are concerned with methods of analysis. Chapter references.

6240 Reference Book of Inorganic Chemistry. Ed. 3. Wendell M. Latimer and Joel H. Hildebrand. 625 pages. 1951. MacMillan Co., New York. (QD151 L34r3)

Presents essential chemical facts briefly, clearly, and in relation to other facts and principles. A discussion of nuclear fission and various pile reactions has been added.

6241 An Introduction to the Chemistry of the Silicones, Ed. 2. Eugene G. Rochow. 213 pages. 1951. John Wiley & Sons, New York. (QD412.S6 R58i2)

The marked industrial success of silicones has made it necessary to expand the original presentation; it now covers most of the recent theory and applications, and includes such new chapters as: The Carbon-Silicon Bond, Synthesis of Organosilicon Compounds, The Physical Chemistry of Silicones. Includes greatly enlarged tables of physical properties of organosilicon compounds with references to the original work on each compound, and an extensive bibliography.

6242 Fluorine and Its Compounds. R. N. Haszeldine and A. G. Sharpe. 153 pages. 1951. Methuen & Co., London. (QD181.F1 H27f)

Presents a review of the modern inorganic and organic chemistry of fluorine, laying special emphasis on the relation between structure and properties of inorganic fluorides, and of the influence of fluorine on the properties and reactivity of organic compounds. 91 ref.

See also:

5118 (electrolysis of molten Cu_2Cl_2)
5119 (electrolysis of $NiCl_2$)
5329 (electrode potentials during electrolysis of salts)
5330 (electrolysis of Zn salts)
5664 (condensation in mineral chemistry)
5862 (dissociation energy of nitrogen)
6039 (chemistry of wood diffusion)
6276 (heat of formation of ethyl radical)
6277 (heat of formation of n-propyl radical)
6356 (statistical and quantum mechanics)
6492 (cascade separation performance)

27. CHEMISTRY—ORGANIC

6243* The Mechanism of Catalytic Oxidation of Tetralin and Decalin in the Vapor Phase. (In Russian.) S. R. Rafikov and B. V. Suvorov. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 1, 1952, p. 61-63.

Briefly discusses the above.

6244* Catalytic Oxidation of the Basic Components of Turpentine in the Vapor Phase. (In Russian.) S. R. Rafikov and B. V. Suvorov. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 11, 1952, p. 265-267.

Briefly discusses chemistry of the above. 11 ref.

6245 Dimethylaminoboron Dichloride and Difluoride. John F. Brown, Jr. *Journal of the American Chemical Society*, v. 74, Mar. 1952, p. 1219-1221.

The reaction of triethylamine with dimethylamine-boron trichloride in benzene solution gave a 73% yield of dimethylaminoboron dichloride. Pyridine with dimethylamine boron trifluoride gave mainly a 1:1 adduct; but when dimethylamine boron trifluoride was pyrolyzed, it gave a 31% yield of dimethylaminoboron difluoride dimer, along with the disproportionation products trimethylamine boron trifluoride and tetramethlammonium fluoborate.

6246 Polarography of Carbonyl Compounds. I. Linear Unsaturated Conjugated Molecules. II. A Theoretical Relationship Between the Polarographic Half-Wave Potentials and Structures of Carbonyl Compounds. Dale M. Coulson and William R. Crowell. *Journal of the American Chemical Society*, v. 74, Mar. 5, 1952, p. 1290-1297.

11 references.

6247 Reactions of Peracids. IV. The Reaction of Acetyleyclanes With Perbenzoic Acid. S. L. Friess and Rex Pinson, Jr. **VII. Nuclear Oxidation of Aromatic Ethers With Perbenzoic Acid.** S. L. Friess, A. H. Soloway, B. K. Morse, and W. C. Ingersoll. *Journal of the American Chemical Society*, v. 74, Mar. 5, 1952, p. 1302-1309.

25 references.

6248 Experiments on Compound Formation in Solutions at Low Temperatures. Iodine and Olefins. Simon Freed and Kenneth M. Sancier. *Journal of the American Chemical Society*, v. 74, Mar. 1952, p. 1273-1275.

Adsorption spectra of solutions of iodine in olefins at temperatures from 77 to 230°K. show the presence of ultraviolet bands which match those of iodine in aromatic hydrocarbons previously reported. Addition compounds are formed by iodine with the various olefins examined, either pure or dissolved in propane. Cyclopropane also combines with iodine in the same way in agreement with the double-bond character often attributed to it.

6249 Solubility of Gaseous Paraffins in Methanol and Isopropyl Alchol. Carl B. Kretschmer and Richard Wiebe. *Journal of the American Chemical Society*, v. 74, Mar. 5, 1952, p. 1276-1277.

Solubilities of propane, n-butane, and isobutane in methanol and isopropyl alchol were measured at pressures up to one atm. and at temperatures between 0 and 50°C. Measurements of the vapor pressure of isopropyl alchol are included. 13 ref.

6250 Dialkylaminogermanes and Dialkylaminosilanes. Herbert H. Anderson. *Journal of the American Chemical Society*, v. 74, Mar. 20, 1952, p. 1421-1423.

Covers preparation of above compounds, presenting 8 that are new and their properties. Includes a modified method of changing a chloride into an iodide and discusses tetrachlorides of C, Si, Ge, Sn, and Pb and their reactions with alkylamines, aniline, and ammonia. 16 ref.

6251 Investigations on the Mechanism of Catalytic Hydrogenations. XVI. Studies on Unsaturated Aliphatic Acids. XVII. Reductions With Rhodium on Activated Carbon. W. P. Dunworth and F. F. Nord. *Journal of the American Chemical Society*, v. 74, Mar. 20, 1952, p. 1457-1462.

Part XVI is concerned with a kinetic study of rate of hydrogenation of various unsaturated fatty acids and the factors determining velocity of reduction, using colloidal Pd and Rh as catalysts. Part XVII discusses reduction of various functional groups with a 5% rhodium-on-activated-carbon catalyst. Tables, a diagram, and 24 ref.

6252 Organic Peroxides. XVI. Acetylene Peroxides and Hydroperoxides—A New Class of Organic Peroxides. Nicholas A. Milas and Orville L. Mageli. *Journal of the American Chemical Society*, v. 74, Mar. 20, 1952, p. 1471-1473.

Describes synthesis of the above. Infrared spectrograms.

6253 The Dehydration of Methylalkylcyclopropylcarbinols. Isolation and Purification of 2-Cyclopropylalkenes. Vernon A. Slabey and Paul H. Wise. *Journal of the American Chemical Society*, v. 74, Mar. 20, 1952, p. 1473-1476.

10 references.

6254 Synthesis and Characterization of Ethylene/Carbon Monoxide Copolymers, A New Class of Polyketones. M. M. Brubaker, D. D. Coffman, and H. H. Hoehn. *Journal of the American Chemical Society*, v. 74, Mar. 20, 1952, p. 1509-1515.

A report on the above. The new polyketones contain —CO— and $-CH_2CH_2-$ units, display the chemical reactivity characteristic of carbonyl compounds, and range from liquids to solid polymers of high molecular weight. Tables, spectrograms, and 14 ref.

6255 The Occurrence of Anhydrides in the Pyrolysis of Monocarboxylic Acids. David Davidson and Paul Newman. *Journal of the American Chemical Society*, v. 74, Mar. 20, 1952, p. 1515-1516.

A report on the above. Results suggest that the known, exothermic hydrolysis of anhydrides is a generally reversible reaction. Patent citations and 19 ref.

6256 Improvements in the Simple Distillation of Fatty Acids by Continuous Methods. Ralph W. Berger, *Journal of the American Oil Chemists' Society*, v. 29, Mar. 1952, p. 81-87.

Discusses a recently developed design embodying both generally recognized principles and a true appreciation for the heat sensitivity of fatty acids. This process has been in highly successful, full-scale commercial operation since 1946. Diagrams, illustrations, and tabular data.

6257 Melting Points and Solubilities of Ternary Mixtures Containing Oleic Acid. Ernest Schlenker. *Journal of the American Oil Chemists' Society*, v. 29, Mar. 1952, p. 94-97.

Discusses experimental procedure and results of the above investigation. 10 ref.

6258 Synthesis of Organic Deuterium Compounds. II. Propyne-3-d_3 and Propyne-d_4. L. C. Leitch and R. Renaud. *Canadian Journal of Chemistry*, v. 30, Feb. 1952, p. 79-83.

6259 The Papilionaceous Alkaloids. XV. The Structure and the Partial Synthesis of Rhombifoline. William F. Cockburn and Leo Marion. *Canadian Journal of Chemistry*, v. 30, Feb. 1952, p. 92-101.

10 references.

6260 The Polymerization of Isoprene and 2, 3-Dimethylbutadiene and Copolymerization With Styrene at —18°C. in Emulsion. R. J. Orr and H. Leverne Williams. *Canadian Journal of Chemistry*, v. 30, Feb. 1952, p. 108-123.

20 references.

6261 The Molecular Rotations of Polycyclic Compounds. W. Klyne. *Chemistry & Industry*, Feb. 23, 1952, p. 172-173.

Shows that the qualitative application of the Rule of Shift (Freudenberg, 1933) can serve to link together the stereochemistry of different groups of polycyclic compounds.

6262* The Second Virial Coefficients of Some Organic Molecules. S. D. Hamann and J. F. Pearse. *Transactions of the Faraday Society*, v. 48, Feb. 1952, p. 101-106.

A differential method was applied in determinations of the second virial coefficients of some organic gases. Results show that the method has considerable accuracy. Data are tabulated. 21 ref.

6263* Chlorination of Cyclohexane; A New Isomer of Hexachlorocyclohexane. (In French.) Roland Jaunin and Angélo Germano. *Helvetica Chimica Acta*, v. 35, Feb. 1, 1952, p. 392-396.

Describes structure and experimental details for the production of the above; a new hexachlorocyclohexane and a new heptachlorocyclohexane were isolated by means of chromatography from chlorination products of tetrachloro-1,2,4,5-cyclohexane at 173-174°F.

6264 Catalytic Vapor-Phase Oxidation of Some Four-Carbon Hydrocarbons. R. H. Bretton, Shen-Wu Wan, and B. F. Dodge. *Industrial and Engineering Chemistry*, v. 44, Mar. 1952, p. 594-603.

Quantitative information on effect of hydrocarbon structure, catalyst type and structure, and operating conditions on types and amounts of products formed was obtained for several 4-carbon hydrocarbons. Data are graphed and tabulated. 24 ref.

27. *Chemistry—Organic*

6265 Propane-Propylene System; Vapor-Liquid Equilibrium Relationships. G. H. Hanson, R. J. Hogan, W. T. Nelson, and M. R. Clines. *Industrial and Engineering Chemistry*, v. 44, Mar. 1952, p. 604-609.

Presents a correlation of high-pressure equilibrium data for 8 isotherms based on theoretical considerations. Tables and graphs.

6266* On the Catalytic Hydrolysis of Chlorobenzene to Phenol in the Vapor Phase. I. Relationship Between Preparation Method for the Silica Gel—Cupric Chloride Catalyst and Its Catalytic Activity. (In Japanese.) Nobuto Ohta. *Reports of the Government Chemical Industrial Research Institute, Tokyo*, v. 46, June 1951, p. 163-172.

20 references.

6267* Studies on the Synthesis of Butanol and Other Higher Alcohols From Lower Alcohols. I. Condensation of Methanol With Isopropanol in a Normal-Pressure Hydrogen Atmosphere. II. Condensation of Lower Alcohols in a High-Pressure Hydrogen Atmosphere. (In Japanese.) Kanoh Komatsu. *Reports of the Government Chemical Industrial Research Institute, Tokyo*, v. 46, Sept. 1951, p. 225-238.

12 references.

6268* Studies on the Synthesis of Glycerine From Propylene. (In Japanese.) Kanoh Komatsu. *Reports of the Government Chemical Industrial Research Institute, Tokyo*, v. 46, Sept. 1951, p. 239-248.

Above synthesis of glycerine from propylene was carried out in the following sequence: propylene→allyl chloride→allyl alcohol→chlorohydrin→glycerine. Reaction conditions were studied. Plotting refractive indices vs. concentrations of allyl alcohol solution is quicker and more reliable than by the curve of densities vs. concentrations for determination of allyl alcohol. Data are tabulated and charted.

6269* Synthesis of Artificial Essential Oils. (In Japanese.) **VI. Synthesis of Aldehyde C_{16} and Phenylglycidic Acid Ester. VII. Synthesis of Phenyl-Ethyl Alcohol.** Hiroshi Horiguchi and Takaari Yumoto. **VIII. Synthesis of Diphenyl Methane.** Hiroshi Horiguchi. **IX. Synthesis of Benzaldehyde.** Hiroshi Horiguchi and Iwao Kamitani. *Reports of the Government Chemical Industrial Research Institute, Tokyo*, v. 46, Dec. 1951, p. 261-278.

27 references.

6270* Formaldehyde Condensations With Phenol and Its Homologues. XIV. The Dehalogenation of Phenolic Alcohols Having Halogen Substituents in the Nucleus. S. R. Finn and J. W. G. Musty. *Journal of Applied Chemistry*, v. 2, Feb. 1952, p. 88-90.

6271 The Reaction of Ethyl Radicals With Deuterium. M. H. J. Wijnen and E. W. R. Steacie. *Journal of Chemical Physics*, v. 20, Feb. 1952, p. 205-207.

Presents results of experiments on above reaction. The ethyl radicals were produced by photodecomposition of diethyl ketone. 12 ref.

6272 Hydrogen Redistribution During Olefin Hydrogenation. C. D. Wagner, J. N. Wilson, J. W. Otvos, and D. P. Stevenson. *Journal of Chemical Physics*, v. 20, Feb. 1952, p. 338-339.

Results reported indicate a type of exchange, hitherto not reported, involving migrations of hydrogen atoms among adsorbed hydrocarbon residues.

6273 Lifetimes of Active Molecules. I-II. R. A. Marcus. *Journal of Chemical Physics*, v. 20, Mar. 1952, p. 352-359.

Specific dissociation constants for various vibrationally excited molecules (methane, ethane, and propane) are inferred from an interpretation of experimental data on atomic cracking reactions and on the deuterization of free radicals. In Part II, experimental data on atomic cracking of propyl radicals and on deuterization of methyl radicals are compared with some theoretical calculations. Data on a number of free-radical reactions are correlated. 12 ref.

6274 Unimolecular Dissociations and Free Radical Recombination Reactions. R. A. Marcus. *Journal of Chemical Physics*, v. 20, Mar. 1952, p. 359-364.

From a consideration of the reverse process of unimolecular dissociation, some equations are derived using an extension of earlier transition state and quasi-unimolecular theories. The present paper is an extension of a previously developed theory for the recombination of methyl radicals and iodine atoms.

6275 Recombination of Methyl Radicals and Atomic Cracking of Ethyl Radicals. R. A. Marcus. *Journal of Chemical Physics*, v. 20, Mar. 1952, p. 364-368.

Available data on above reactions are correlated by means of a previously developed theory. Some experimental results on steric factor and the data on the remaining subjects appear to be consistent with the assumption that the methyl radicals must be highly oriented with respect to each other in order for recombination to occur. Further experimental work on these reactions is recommended. 15 ref.

6276 The Pyrolysis of n-Propyl-Benzene and the Heat of Formation of Ethyl Radical. C. H. Leigh and M. Szwarc. *Journal of Chemical Physics*, v. 20, Mar. 1952, p. 403-406.

6277 The Pyrolysis of n-Butyl-Benzene and the Heat of Formation of n-Propyl Radical. C. H. Leigh and M. Szwarc. *Journal of Chemical Physics*, v. 20, Mar. 1952, p. 407-411.

6278 The Hot Atom Chemistry of the Propyl Bromides; Effect of Phase and Recoil Energy on Retentions. Maurice S. Fox and W. F. Libby. *Journal of Chemical Physics*, v. 20, Mar. 1952, p. 487-497.

Yields of the various organic radiobromides formed by neutron irradiation of liquid and solid iso- and n-propyl bromides at various temperatures were determined. 23 ref.

6279 On the Effect of Iodine in the Radiolysis of the Hydrocarbons. Clarence C. Shubert and Robert H. Schuler. *Journal of Chemical Physics*, v. 20, Mar. 1952, p. 518-519.

Data on the above are tabulated, charted, and discussed.

6280 Electronic Effects and Rates in the Diels-Alder Reaction. Joseph J. Dudkowski and Ernest I. Becker. *Journal of Organic Chemistry*, v. 17, Feb. 1952, p. 201-206.

Reports the results of a preliminary investigation to apply a theory of electronic effects to the reaction rates of Diels-Alder reactions. The reaction chosen for study is that between tetracyclone (tetraphenylcyclopentadienone) and acetylenic dienophiles. 37 ref.

6281 The Chemistry of Hydroperoxides. XI. Hydroperoxides as Oxidizing and Reducing Agents. M. S. Kharasch, A. Fono, W. Nudenberg, and Bruno Bischof. *Journal of Organic Chemistry*, v. 17, Feb. 1952, p. 207-220.

The above was investigated; results are presented and discussed.

6282 Condensation of Phenols and Naphthols With Styrene. Ng. Ph. Buu-Hoi, Henri Le Bihan, and Fernand Binon. *Journal of Organic Chemistry*, v. 17, Feb. 1952, p. 243-248.

The condensation of styrene with various phenols, diphenols, and naphthols, in the presence of H_3PO_4 or H_2SO_4, was investigated. The constitution of the phenylethylated products thus obtained is discussed, and several of their functional derivatives are described.

6283 Solubilities of Saturated Fatty Acid Esters. R. S. Sedgwick, C. W. Hoerr, and H. J. Harwood. *Journal of Organic Chemistry*, v. 17, Feb. 1952, p. 327-337.

The solubilities of the methyl esters of caprylic, lauric, myristic, palmitic, and stearic acids were determined in benzene, cyclohexane, carbon tetrachloride, chloroform, ethyl acetate, butyl acetate, methanol, 95% ethanol, n-butanol, acetone, and acetonitrile. The solubilities of methyl tridecanoate and of ethyl, n-propyl, and n-butyl stearates were determined in several of these solvents. The behavior of the esters is compared on a molecularly equivalent basis with that of the corresponding fatty acids.

6284 The Reaction of Cyanogen With Organic Compounds. V. Mercaptans. Henry M. Woodburn and Cyrus E.

Sroog. *Journal of Organic Chemistry*, v. 17, Mar. 1952, p. 371-378.

The research was undertaken to establish the true nature of the reaction between cyanogen and mercaptans. 12 ref.

6285 Prediction of Isomeric Differences in Paraffin Properties. John R. Platt. *Journal of Physical Chemistry*, v. 56, Mar. 1952, p. 328-336.

Critically examines parameters proposed for predicting paraffin properties. Proposes hypothesis that Wiener number is an index of the mean external contact area of the molecule, except for a correction for steric hindrance. 14 ref.

6286* Studies on Oxo-Process. Part I. Synthesis of Propionaldehyde From Ethylene, Carbon Monoxide & Hydrogen in the Gas Phase in Presence of Cobalt Catalysts at High Pressures. S. K. Bhattacharyya and B. C. Subba Rao. *Journal of Scientific & Industrial Research*, v. 11B, Feb. 1952, p. 80-81.

6287 Synethesis and Physical Properties of n-Heptane and 2,2,4-Trimethylpentane. Philip Pomerantz. *Journal of Research of the National Bureau of Standards*, v. 48, Jan. 1952, p. 76-81.

Details of above syntheses are presented, and physical properties of the compounds are reported. 18 ref.

6288* Styrenation and Esterification of Tall Oil. Wouter Bosch and Richard B. Drubel. *Official Digest*, Dec. 1951, p. 894-901.

Tall-oil acids, varying in rosin and fatty-acid contents, were styrenated and esterified, and then made into varnishes and white paints. It was found that tall oil can be styrenated relatively easily when a mixture of styrene, alpha methyl styrene, and benzoyl peroxide is added at a very slow rate. Properties were determined. Data are tabulated. 18 ref.

6289* Thermal Quantities of Some Cycloparaffins. Part I. Syntheses. (In English.) Sj. Kaarsemaker and J. Coops. *Recueil des Travaux Chimiques des Pays-Bas*, v. 70, Dec. 1951, p. 1033-1041.

The following substances were prepared in order to accurately determine their heats of combustion: cyclobutane, cycloheptane, cyclooctane, and cyclononane. 22 ref.

6290* Thermal Quantities of Some Cycloparaffins. Part II. Purification of the Samples. (In English.) Sj. Kaarsemaker and J. Coops. *Recueil des Travaux Chimiques des Pays-Bas*, v. 71, Jan. 1952, p. 125-136.

Purification of the cyclanes with 4 to 9 C atoms was effected by fractional distillation. Progress of the purification was checked with the aid of melting curves of the fractions (heat content vs. temperature curves.) A fractionating column with a rotating cylinder and a small calorimeter for measurements on melting and transition processes at temperatures from 1180 to +70° are described and diagrammed.

6291* Study by Infrared Spectrography of the Kinetics of the Catalytic Hydrogenation of Propionic Acid and of its Ethylenic Isomerization by Iodine. (In French.) G. Gauthier, J. Guy, and R. Delaby. *Bulletin de la Société Chimique de France*, Nov.-Dec. 1951, p. 919-925.

35 references.

6292* Polymerization of Fluoro-Olefins. (In Russian.) I. L. Knuniants and A. V. Fokin. *Uspekhi Khimii*, v. 20, July-Aug. 1951, p. 410-429.

Reviews existing knowledge concerning the above. 116 ref.

6293* Radical Splitting Reactions of Completely Unsymmetrical Derivatives of Tin. (In Russian.) G. Razuvaev and V. Fetiukova. *Zhurnal Obshchei Khimii*, v. 21(83), June 1951, p. 1010-1015.

The photochemical reactions of diethyldiphenyl tin with CCl_4, $CHCl_3$, and CH_3OH were studied. Data are discussed and summarized. 18 ref.

6294* Investigaton of the Isomerization and Polymerization of Dimethylvinylcarbinol Depending on pH of the Reagent. (In Russian.) A. I. Lebedeva and L. L. Shchukovskaia. *Zhurnal Obshchei Khimii*, v. 21(83), June 1951, p. 1132-1139.

Data are tabulated and charted.

6295* Chloromethylation and Subsequent Reduction of Aromatic Nitro Compounds. V. M. Berezovskii, V. A. Kurdiukova, and N. A. Preobrazhenskii. *Zhurnal Obshchei Khimii*, v. 21(83), June 1951, p. 1163-1166.

6296* The Interaction of Vinyl Iodide With Magnesium. (In Russian.) Iu. I. Iushenko. *Zhurnal Obshchei Khimii*, v. 21 (83), July 1951, p. 1244-1247.

Above reactions were investigated experimentally. Results are discussed and summarized.

6297* Transformations of Hydrocarbons in the Presence of Oxide Catalysts. III. Role of Separate Transformations During the Aromatization of Paraffinic and Olefinic Hydrocarbons by Chromium Catalysts. (In Russian.) R. D. Obolentsev and Iu. N. Usov. *Zhurnal Obshchei Khimii*, v. 21(83), Aug. 1951, p. 1438-1452.

15 references.

6298* Thermal Chlorination of Normal Butane. (In Russian.) B. A. Krentsel and N. A. Pokotilo. *Zhurnal Prikladnoi Khimii*, v. 24, July 1951, p. 727-732.

Experimental data are tabulated, charted, and discussed.

Books

6299 Six-Membered Heterocyclic Nitrogen Compounds With Four Condensed Rings. C. F. H. Allen, editor. 345 pages. 1951. Interscience Publishers, New York. (QD401 A153s)

Second volume of series devoted to a modern detailed and comprehensive presentation of heterocyclic chemistry by a group of authorities. Each of the 7 sections is followed by a comprehensive list of literature and patent references.

6300 The Chemistry of Lignin. Friedrich Emil Brauns. 808 pages. 1952. Academic Press, New York. (QD321 B73c)

A comprehensive treatise on the above. Chapter references.

6301 Adsorption and Chromatography. Harold Gomes Cassidy. 360 pages. 1951. Interscience Publishers, New York. (Technique of Organic Chemistry, v. 5.) (QD271 C27a)

Describes and explains by discussion of principles, the various methods by which adsorption may be utilized in organic chemistry as a tool for separation of mixtures. Includes numerous footnote references.

6302 Textbook of Organic Chemistry. Ed. 3. George Holmes Richter. 762 pages. 1952. John Wiley & Sons, New York. (QD251 R41t3)

A comprehensive treatment of the above.

6303 Styrene. Alger L. Ward and William J. Roberts. 126 pages. 1951. Interscience Publishers, New York. (TP986 W21s)

Describes the above. Discusses its preparation; purification; care and handling of monomers; physical, thermodynamic, and chemical properties; and its polymerization reactions. 201 ref.

6304 Chemistry of Carbon Compounds. Vol. I. Part A. General Introduction and Aliphatic Compounds. E. H. Rodd, editor. 777 pages. 1951. Elsevier Publishing Co., New York. (QD251 C42)

A comprehensive treatment of the above.

6305 Technique of Organic Chemistry. Vol. III. Arnold Weissberger, editor. 661 pages. 1950. Interscience Publishers, New York. (QD245 H35)

The following topics are comprehensively treated by experts in the respective fields: heating and cooling; mixing; centrifuging; extraction and distribution; dialysis and electrodialysis; crystallization and recrystallization; filtration; and solvent removal, evaporation, and drying. Numerous footnote references.

6306 A. F. Holleman's Organic Chemistry. J. P. Wibaut. 660 pages. 1951. Elsevier Publishing Co., New York. (QD251 H72Ltr)

A continuation of Holleman's "Textbook of Organic Chemistry," the last English edition of which appeared in 1930.

27. *Chemistry—Organic*

Topics of a fundamental nature, like molecular structure and the mechanisms of chemical reactions, are treated in connection with discussions of the relevant compounds.

6307 Technique of Organic Chemistry. Vol. IV. Distillation. 668 pages. 1951. Interscience Publishers, New York. (QD63.D6 D63)

Gives a comprehensive account of the theory and practice of batch distillation on a laboratory scale.

See also:
5288 (organic compounds in the plating industry)
6048 (chemistry of fats)
6099 (acetylene chemistry—book)
6241 (chemistry of the silicones—book)
6242 (organic fluorine compounds—book)
6372 (organic compounds in rubber compounding)

28. PLASTICS AND HIGH POLYMERS

6308* Influence of Metallic Ions on the Elastoplastic Characteristics of Ethylcellulose. (In Russian.) S. A. Glikman and O. G. Efremova. *Doklady Akademii Nauk SSSR*, new ser., v. 81, Dec. 21, 1951, p. 1089-1092.

Tests were made of the above under both static and dynamic conditions. Additions of Ca^{++} and Fe^{+++} ions were used. Data are discussed, tabulated, and charted.

6309* Some Variables in Improving the Crease Recovery of Cotton Fabrics With Synthetic Resins. A. C. Nuessle, chairman. *American Dyestuff Reporter*, v. 41, Mar. 31, 1952, p. 196-212.

A comparison of various resin types on 2 cotton fabrics. Covers the effect of catalysis and curing conditions, before and after mercerization, and of stiffening and softening agents on a variety of fabrics. Only crease resistance and tear strength were measured. 13 ref.

6310* Polyamide Resins for the Converting Industry. Harold Wittcoff. *American Paper Converter*, v. 26, Apr. 1952, p. 12-13, 50-51.

Describes useful resins for paper converters. Includes tabular data on properties.

6311 Heat Distortion of Polystyrene. K. J. Cleereman, H. J. Karam, and J. L. Williams. *American Society for Testing Materials Bulletin*, Feb. 1952, p. 37-44.

An extensive study was made to determine effects of annealing during the conditioning of polystyrene. The annealing variables, time and temperature, were varied over a wide range. Effects of annealing on heat distortion, crazing, and other physical properties were studied. Effect of applied load for conditioned and unconditioned specimens was investigated. 12 ref.

6312 Interaction of Polymers and Mechanical Waves. W. O. Baker and J. H. Heiss. *Bell System Technical Journal*, v. 31, Mar. 1952, p. 306-356.

New techniques of Mason, McSkimin, Hopkins, and coworkers for generation of shear waves were used to study mechanical properties of chain polymers. Polymer solids, melts, and dilute solutions were explored to find the characteristic relaxation times, rigidities, and viscosities of various chemical structures. 74 ref.

6313 Fabrication of Decorative Laminates. *British Plastics*, v. 25, Mar. 1952, p. 90-95.

Describes, diagrams, and illustrates equipment and procedures.

6314 What's New in Thermoplastics. *Canadian Chemical Processing*, v. 36, Mar. 1952, p. 64, 66, 68. (Résumé of address by Frazier Groff at the Annual Conference of Society of the Plastics Industry, Toronto, Feb. 22, 1952.)

Discusses Bakelite Company development products believed to have large commercial potentialities for the plastic industry. Includes a copolymer of styrene and acrylonitrile superior to polystyrene in chemical resistance and mechanical properties; a special polystyrene suitable for use as bristle and as fibers in brooms; and rubber-plasticized polystyrenes with higher impact strength and greater ductility, obtained by modifying polystyrene and copolymers of styrene and other monomers with copolymers of various synthetic rubbers.

6315 Dielectric Dispersion in Solid Polyvinyl Butyral. B. L. Funt. *Canadian Journal of Chemistry*, v. 30, Feb. 1952, p. 84-91.

Above was investigated at frequencies of 0.3, 1, 3, 10, 30, and 100 kc. at temperatures from 20 to 140°C. The data indicated severely restricted dipole rotation and yielded an extrapolated relation time of 10^4 sec. at 25°C. 13 ref.

6316 Lending Textiles a Hand. *Chemical Week*, v. 70, Mar. 15, 1952, p. 37-38.

Discusses Warwick Chemical Co.'s single-resin method for producing water repellency, spot resistance, wrinkle and crease resistance, and shrink resistance in rayon and rayon blends.

6317* Glass-Reinforced Alkyd Plastics. M. H. Bigelow and P. E. Nowicki. *Electrical Manufacturing*, v. 49, Apr. 1952, p. 110-113, 312.

Discusses the above developed by Plaskon Div., Libbey-Owens-Ford Glass Co. It is a polyester resin reinforced with glass fibers, which can be molded in conventional molds, cures rapidly, and requires only moderate pressures. In particular, it has exceptionally high impact strength. Indicated applications include replacement for metals in housings and other structural parts. Lists electrical design factors and properties.

6318* Morphological Aspects of Abrasion and Wear. G. Salomon. *Engineering*, v. 173, Mar. 7, 1952, p. 310-312.

Wear phenomena of some organic materials of construction is considered against the well-known background of metal science. Recent work in this field, together with some relevant observations on polymer films, is surveyed.

6319* The Injection Molding Cycle. G. D. Gilmore. *India Rubber World*, v. 125, Mar. 1952, p. 722-725.

Presents information on progress and future of fabrication of plastics by the above process.

6320 Carbon Black Flocculation in Rubber to Metal Cements. G. M. Sheehan, Gerard Kraus, and A. B. Conciatori. *Industrial and Engineering Chemistry*, v. 44, Mar. 1952, p. 580-582.

Studies the function of carbon black in cements for adhering rubber to metal. Cements containing GR-S and carbon black as the main constituents considerably increase adhesion of rubber to brass and to steel coated with various resinous primers, provided the carbon black is strongly flocculated. Data are tabulated. 11 ref.

6321 On the Frequency Dependence of the Viscosity of High Polymer Solutions. Roger Cerf. *Journal of Chemical Physics*, v. 20, Mar. 1952, p. 395-402.

The theory is compared with experimental results of Baker, Mason, and Heiss, and of Rouse, on polystyrene. The theory gives a good picture of the phenomena as a whole and is particularly successful in describing the apparently anomalous temperature dependence of the elasticity coefficient of polystyrene solutions at high frequencies. Possibilities of high-frequency viscosity measurements are discussed. 20 ref.

6322* Fourth Macromolecular Physics Conference. (In French.) *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 48, Nov.-Dec. 1951, p. 527-659.

Presents a series of 34 papers in French and English presented at the above conference held on Apr. 5-6, 1951, in Paris, including 12 papers dealing with proteins.

6323* Determination of the Average Molecular Weight of Vinyl Molecules in Solid Vinyl Plastics. (In French.) Pierre Girard, Paul Abadie, and Robert Charbonniere. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 48, Nov.-Dec. 1951, p. 569-570.

Presents results of a short study of the above. Data are charted.

6324 Solubility of Polymethyl Methacrylate and Polyvinyl Acetate. Hubert Daoust and Marcel Rinfret. *Journal of Colloid Science*, v. 7, Feb. 1952, p. 11-19.

Purpose of the work was to find a number of good solvents for polymethyl methacrylate and polyvinyl acetate. Correlations

among intrinsic viscosity, cohesive energy, density, dipole moment, and dilution ratio were also investigated. 16 ref.

6325 Some Contributions of the Petroleum Chemical Industry in the Surface Coatings Field. R. N. Wheeler. *Journal of the Oil & Colour Chemists' Association*, v. 35, Mar. 1952, p. 107-117.

Surveys the above giving chemical reactions for various processes. Applications of epichlorohydrin resins in can coatings, wire enamels, and coatings for Al and light alloys are briefly discussed.

6326* Insulating Materials for Electrical Cables and Conductors With Special Emphasis on Polystyrene Foam Material. (In German.) F. Heitzmann. *Kunststoffe*, v. 42, Feb. 1952, p. 29-34.

Includes extensive tabular presentation of pertinent properties of a wide variety of materials (25) for above uses, as well as photomicrographs showing pore structure of the polystyrene types.

6327* Processing PVC Pastes. Research on the Gelatinizing Effects and Volatility of Different Plasticizers. (In German.) Gerhard Beck. *Kunststoffe*, v. 42, Feb. 1952, p. 37-40.

Surveys the above. Data are graphed and tabulated.

6328* Stabilizers for Polyvinylchloride. (In German.) A. Rosenberg. *Kunststoffe*, v. 42, Feb. 1952, p. 41-43.

Discusses the chemical and physical causes of PVC disintegration and evaluates presently known organic stabilizers. A simple test is shown to indicate quality of different PVC stabilizers; and results from new stabilizers are evaluated. Data are tabulated.

6329* Coating an Ingot-Steel Roll With Hard PVC. (In German.) Jakob Bernhard. *Kunststoffe*, v. 42, Feb. 1952, p. P13-P14.

Describes and diagrams above process used to provide corrosion resistance required for certain applications.

6330* Foam Plastics as Materials for Inserts in Orthopedic Shoes. (In Russian.) A. M. Sokov. *Legkaya Promyshlennost*, v. 11, June 1951, p. 41-42.

The use of foamed plastics instead of cork or wood for building up corrective shoes is discussed. Several compounds are described. Data are tabulated on properties of 9 compositions.

6331 Fluorocarbon Plastics Bonded to Metals and Rubbers to Provide New Composite Materials. *Materials & Methods*, v. 35, Mar. 1952, p. 96-97.

Surveys above properties and applications of Teflon (Du Pont) and Kel-F (M. W. Kellogg Co.)

6332 How to Design With Laminated Plastics for Machining, Stamping, and Postforming. Benjamin L. Hummel. *Machine Design*, v. 24, Mar. 1952, p. 112-122.

Presents an appraisal of laminated plastics in standard stock form and outlines some of the fundamental essentials to their proper design. The materials themselves are discussed in detail.

6333* Methods of Heating Laminated Plastics for Postforming. William I. Beach. *Machinery* (London), v. 80, Feb. 28, 1952, p. 367-371.

Thermal properties and effects of different temperatures and heating times on above material are described. A brief comparison is made of the principal types of heating units.

6334 The "Hard" Vinyls. *Modern Plastics*, v. 29, Apr. 1952, p. 87-93.

Describes rigid polyvinyl chloride materials with respect to foreign progress, fabricating, joining, and applications. Illustrated.

6335 New Polyester-Glass Compound. *Modern Plastics*, v. 29, Apr. 1952, p. 94.

Describes the above developed by Atlas Powder Co. It is suitable for compression or transfer molding, and is said to have good flow characteristics, even at low pressures, despite length of the fibers. Electrical parts, switches, connectors, relay cases, and similar parts are among the applications forseen for the new compound.

6336 Silicone-Glass for Low Pressure. *Modern Plastics*, v. 28, Apr. 1952, p. 106, 181-182.

Describes low-pressure silicone laminating and molding resin developed by Dow Corning. Property data are tabulated.

6337 Army Sleds for the Arctic. Carl E. Holmes. *Modern Plastics*, v. 29, Apr. 1952, p. 115-118.

Describes production of Army sleds molded of glass mat impregnated with polyester resin.

6338 Continuous Extrusion of Variegated Strip. *Modern Plastics*, v. 29, Apr. 1952, p. 120-121, 124-125.

Discusses experimentation on production of variegated or tortoise-shell plastic strip by extrusion. Experiments were made on cellulose acetate (Tenite I) and cellulose acetate butyrate (Tenite II.)

6339 Protection of Cellulose Esters Against Breakdown by Heat and Light. G. C. DeCroes and J. W. Tamblyn. *Modern Plastics*, v. 29, Apr. 1952, p. 127-128, 130, 132, 134, 136, 185-189.

Causes of the degradation, occurring when cellulose ester plastic systems are exposed to excessive heat, were investigated. Results are discussed. 35 ref.

6340* The Hardening of Phenolformaldehyde Resins. Report XXV. Hardening With Hexamethylene Tetramine. IX. (In German.) G. Zigeuner, Th. Völker, E. Wiesenberger, and M. Sobotka. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 83, Feb. 15, 1952, p. 100-113.

Reviews literature on the chemistry of above and describes experiments. 18 ref.

6341* Thermal Polymerization of Esters of Unsaturated Fatty Acids. D. H. Wheeler. *Official Digest*, Nov. 1951, p. 661-668.

Summarizes the chemical reactions which are believed to represent the important ones which occur under conditions of thermal polymerization.

6342 Plastic and Glass Fiber Pipe Has New Basic Uses. *Petroleum Engineer*, v. 24, Mar. 1952, p. D51.

Describes thermosetting, glass-fiber reinforced, plastic pipe which withstands high pressures, yet is light weight; it need not be coated, wrapped, or given cathodic protection; can be placed by hand or with light machines and joints bent to conform with ditch contours.

6343* New Vinyl Co-Polymer Sheet. *Plastics*, v. 17, Mar. 1952, p. 61-63.

Describes and gives data on properties and uses of "Cobex."

6344* Cellulose Acetate Film Protects Print. *Plastics*, v. 17, Mar. 1952, p. 74.

Describes a new Danish process, introduced to this country by Celloglas, Ltd., which gives a decorative and protective surface to printed paper and board, by laminating a very thin cellulose acetate film to the printed matter. Fast production rates bring this method of print protection into a wider field of applications, including book covers, posters, and packages.

6345* Successful Designing for Plastics Moulding. W. M. Halliday. *Plastics*, v. 17, Mar. 1952, p. 83-85.

Further useful design factors are considered as influencing styling and quality of appearance. Special reference is made to the use of partial or wholly decorative features such as lettering and figured impressions. (To be continued.)

6346* Non-Newtonian Flow of Dilute Polymer Solutions. III. Sodium Carboxy Methyl Cellulose in Solutions of Sodium Chloride. (In English.) F. Akkerman, D. T. F. Pals, and J. J. Hermans. *Recueil des Travaux Chimiques des Pays-Bas*, v. 71, Jan. 1952, p. 56-63.

A direct method was used to derive the influence of shearing stress on intrinsic viscosity from experimental data without introducing empirical or semi-empirical relations. Application to carboxymethylcellulose in dilute salt solutions showed that small shear rates have a pronounced effect on intrinsic viscosity. On comparison with existing hydrodynamic theories, it was found that even the fully extended length of the polymer molecule would be too small to explain the results.

28. *Plastics and High Polymers*

6347 The Photo-Degradation of Polymethylmethacrylate. II. Evaluation of Absolute Rate Constants for a Depolymerization Reaction. P. R. E. J. Cowley and H. W. Melville. *Proceedings of the Royal Society*, v. 211, ser. A, Mar. 6, 1952, p. 320-334.

Presents a kinetic analysis on the above involving determination of rate of initiation, rate constant for depropagation, and rate constant for termination. Tables, graphs, 14 ref.

6348* Molecular Engineering. G. F. D'Alelio. *SPE Journal*, v. 8, Mar. 1952, p. 25-27, 40.

General discussion and review of progress in plastics.

6349* Extrusion of Acetate Sheet and Large Pipe. E. C. Blackard. *SPE Journal*, v. 8, Mar. 1952, p. 8-15.

The method discussed does not involve the use of solvents. Describes only features which are considered of unusual value to the extrusion of a better quality product.

6350* A Method of Determining the Concentration Dependence of the Diffusion Coefficient. Hiroshi Fujita and Akira Kishimoto. *Textile Research Journal*, v. 22, Feb. 1952, p. 94-95.

With reference to the diffusion of material in high polymeric substances, information is given on calculation of the dependence of diffusion coefficient on concentration of diffusing material.

6351* Sizing of Spun Nylon Yarns With Various Agents. James H. Langston. *Textile Research Journal*, v. 22, Feb. 1952, p. 111-116.

Presents results of an investigation to develop a better size formulation for spun nylon, both by testing other materials as sizing agents and by modifying agents already in use.

6352* Properties of Fabrics Made From Several Synthetic Fibers and Their Impact on the Textile Industry. G. K. Lake. *Textile Research Journal*, v. 22, Feb. 1952, p. 138-143.

6352a* The Role of Synthetic Fibers in the Textile Industry of the Future. L. G. Ray, Jr. *Textile Research Journal*, v. 22, Feb. 1952, p. 144-151.

6353* Form and Mobility of Fiber Molecules and Its Importance to States of Orientation in High-Polymer Substances. (In German.) H. A. Stuart. *Zeitschrift für angewandte Physik*, v. 4, Jan. 1952, p. 29-37.

Treatise on present-day knowledge on above points to a number of unsolved problems and the need for exact measurement. Diagrams, graphs, tables, and a photomicrograph are presented. 33 ref.

6354* Synthesis of Monomers and Properties of Copolymers. (In Russian.) B. N. Rusovskii and A. M. Shur. *Zhurnal Prikladnoi Khimii*, v. 24, Aug. 1951, p. 850-857.

Influence of comparatively large additions of allyl- and vinylmethacrylate on properties of methylmethacrylate coplymers was determined. Data are tabulated and discussed. Methods of synthesis are described.

Miscellaneous Publications

6355 The Engineering Application of the Absolute Rate Theory to Plastics. I. Laminates. Mervin B. Hogan. Engineering Experiment Station, University of Utah, v. 42, Bulletin 56, Aug. 1951, 149 pages. (TA21 Ut1b)

Creep characteristics of a number of plastic laminates subjected to direct stress, as reported in the literature by several investigators, were analyzed by the Eyring Absolute Rate Theory, utilizing a 4-element mechanical model. A study of the values resulting from evaluation of the several parameters involved in this theory leads to the conclusion that it is applicable to the creep of plastic laminates.

6356* Biassed Random Walks in Classical, Statistical and Quantum Mechanics. Gilbert W. King. Office of Naval Research, Technical Report No. 5, July 20, 1951, 27 pages. (QC174.1 K58b)

Presents recent work on random walks which has been directed to specific problems in the statistical mechanics of high polymers. The phase of the work presented here is of general interest in the mathematical theory of stochastic processes and in various applications in physics and chemistry.

Books

6357 Plastics Molding. John Delmonte. 493 pages. 1952. John Wiley & Sons, New York. (TP986 D38p)

An analysis of the plastics-molding industry and its equipment, as well as the principles and accessories that permit a molder to attain a high degree of versatility. Considers first the flow of materials, and second the techniques for handling the materials once flow has been properly established. Places maximum emphasis on selection and adaptation of equipment to molding problems, and shows the application of scientific principles to molding processes in a manner that should prove most useful to the industry.

6358 Adhesives. 89 pages. 1950. His Majesty's Stationery Office, London. (Selected Government Research Reports, v. 7.) (TP968 G79a)

Includes factors affecting strength of glued joints in Al (synthetic resins), adhesion of glues to plywood, tests to determine the effects of various types of adhesives on the final shape of laminated bends, and the part played by formaldehyde in dermatitis attributable to synthetic-resin glues.

See also:

5237 (adhesives for metals)
5598 (effects of free phenol in phenolic resins)
5601 (determination of monomers in solution)
5771 (high-molecular-weight measurement)
5817 (plastic dental materials)
5878 (dielectric heating of plastics)
5942 (plastic joint for clay pipe)
6069 (sebacic acid in resins)
6254 (new polyketone polymers)
6292 (polymerization of fluoro-olefins)
6294 (polymerization of dimethyldivinylcarbinol)
6590 (hermetic seals)
6777 (durability of nylon)

29. RUBBERS AND OTHER ELASTOMERS

6359* Certain Regularities in the Tensile Strength of Rubber. (In Russian.) G. M. Bartenev. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 1, 1952, p. 49-52.

A direct relationship was found between the tensile strength of rubber and the amount of crystallization that occurs during the test. Tests were made under various conditions of specimen size and testing speed. Data are discussed and charted. 10 ref.

6360* Influence of Carbon Black on the Development of Oxidizing Processes in Natural and Synthetic Rubber. (In Russian.) A. S. Kuzminskii, L. I. Liubchanskaia, N. G. Khitrova, and S. I. Bass. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 1, 1952, p. 131-133.

Presents a discussion of the above. Data are charted.

6361 An Electrical Extensometer for Determining Elongation of Elastomers. C. H. Klute, C. J. Penther, and L. B. McKee. *American Society for Testing Materials Bulletin*, Feb. 1952, p. 44-49.

Describes, illustrates, and gives circuit diagram of above apparatus for automatic recording of elongation of vulcanized rubber samples. It is easily attachable to conventional rubber testers, and allows routine determination of tensile properties with an accuracy exceeding that of techniques generally employed.

6362 Oxidation of Hevea and GR-S Polymers and Their Vulcanizates; Effect of Various Coagulants. N. V. Chalapathi Rao, Hugh Winn, and J. Reid Shelton. *Industrial and Engineering Chemistry*, v. 44, Mar. 1952, p. 576-580.

The effects of various metal salts as coagulants for both Hevea and GR-S polymers were studied. Data are graphed. 12 ref.

6363 Instrumentation of a Synthetic-Rubber Plant. (Concluded.) J. S. Detwiler. *Instruments*, v. 25, Mar. 1952, p. 314-319; disc., p. 319.

Describes the single-controller system; reactor control system;

continuous polymerization; fire-control system; and "Transet" control system. Diagrams.

6364 Statistical Theory of Rubber-Like Elasticity. V. The Stress Birefringence. Akira Isihara, Natsuki Hashitsume, and Masao Tatibana. *Journal of Applied Physics*, v. 23, Mar. 1952, p. 308-312.

Theoretical, mathematical analysis and graphical interpretation.

6365 Morphologic Changes in Gelled Synthetic Latices. Samuel H. Maron and Carl Moore. *Journal of Colloid Science*, v. 7, Feb. 1952, p. 94-102.

A photomicrographic study was made of transformations undergone by synthetic latices during concentration by a method involving electrolyte addition, gelation, cooling, and subsequent filtration.

6366* Structure of Filler-Rubber Systems. (In German.) Friedrich Endter. *Kautschuk und Gummi*, v. 5, Feb. 1952, p. WT17-WT22.

Electron-microscopic studies of the residues from benzene extraction reveal that above has a 3-dimensional structure composed of filler and rubber.

6367* Influence of Plasticity on the Mechanical Properties of a Rubber Mix. (In French.) E. Stalinsky. *Revue Générale du Caoutchouc*, v. 29, Jan. 1952, p. 37-41.

Laboratory experiments on the above are described. Five samples corresponding to 5 different states of depolymerization of a single initial mix which was slightly plasticized were studied. It was found that curing time corresponding to optimum resistance at break depends to a large degree upon state of depolymerization of the rubber of the mix. By study of simultaneous variations of resistance to breaking and elongation at breaking hardness, as functions of time of cure, it was possible to determine the lower and upper limits of plasticity necessary to obtain optimum mechanical characteristics within a minimum time.

6368* Survey of the Principal and Practical Consequences of the Statistical Theory of Elasticity. (In French.) Pierre Thirion. *Revue Générale du Caoutchouc*, v. 29, Jan. 1952, p. 46-48; Mar. 1952, p. 198-201.

Attempts to present in a concise and easily understandable form the essential postulates of the theory as well as recent developments. Applications to rubbers and elastomers are emphasized.

6369* Chemical Structure and Deactivating Effect. (In French.) Jacques Le Foll. *Revue Générale du Caoutchouc*, v. 29, Feb. 1952, p. 114-117.

Influence of chemical structure on deactivating effect was studied, for compounds which are more or less derived from the structure of the first known deactivator—mercaptobenzimidazole—and may be classified in the following 5 groups: thiourea and its N-substituted derivatives, thioacids, thioamides, derivatives of mercaptopyrimidine, thiols, and mercaptopyridine. The experimental results show that the most active structure from the point of view of the deactivating effect is a cyclic one, with a 5 or 6 atom ring, in which the carbon atom bearing the mercaptan function is surrounded by two N atoms or by a N and an O atom.

6370* Thermal-Sensitivity of Fresh Latex. (In French.) G. E. van Gils. *Revue Générale du Caoutchouc*, v. 29, Feb. 1952, p. 117-122.

A method has been developed to measure the "heat-sensitivity" and to determine quantitatively the influence of zinc oxide and ammonium nitrate on this property of latex. Above a given proportion of these products, the gelification time of latex does not decrease further. Preparation of heat-sensitive latex by means of enzymatic break-down of proteins gave good results only with factices at least 3 mos. old. Papain, on the other hand, made it possible to get heat-sensitive latex mixes, even in the case of fresh latex.

6371* Polysar Krynol, a New Step in Synthetic Rubbers. (In French.) E. R. Rowzee. *Revue Générale du Caoutchouc*, v. 29, Feb. 1952, p. 123-126.

Describes new synthetic rubber developed by incorporating into a high-molecular-weight material, too hard to be processed on usual industrial machinery, a significant quantity of a low-molecular-weight material which plays the role of a plasticizer, reduces the viscosity, and facilitates the processing without reducing significantly its mechanical properties. Using a high polymer, prepared according to the "cold" process, various proportions of oil are added by a co-precipitation method. Rubbers prepared in this way and containing 50 parts of oil and 75 parts of carbon black show good mechanical properties. Road tests gave satisfactory results.

6372 Determination of the Hydrocarbon Type of Petroleum Products (and Its Significance for Rubber Compounding). Fritz S. Rostler and Richard M. White. *Rubber Age*, v. 70, Mar. 1952, p. 735-747.

28 references.

6373 Fluotitanate Gelation of Latices. G. H. McFadden and Bailey Bennett. *Rubber Age*, v. 70, Mar. 1952, p. 748-750.

The properties of sodium fluotitanate which make it valuable as a gelling agent for natural rubber latex and various synthetic latices are described. The behavior of the compound in 2 typical high-solids (60%) latices—natural and GR-S Type IV—is presented in some detail with special emphasis on the two important variables: fluotitanate concentration and latex temperature. Comparative data are given for sodium fluosilicate under similar conditions.

Books

6374 Rubber in Mining. A. V. Paull and J. Gallaway. 97 pages. 1951. British Rubber Development Board, Market Buildings, Mark Lane, London. (TS1892 P28r)

Treats the subject from the practical point of view with numerous illustrations and diagrams. Chapters are: Rubber as an Engineering Material; Applications of Rubber in Exploration and Rock-Breaking; Applications of Rubber in Transport; and Rubber in the Treatment Plant.

See also:
6069 (sebacic acid in rubbers)
6312 (mechanical properties of elastomers)
6318 (wear of elastomers—morphological aspects)
6331 (plastic-rubber bonding)
6379 (chlorinated-rubber coatings)
6704 (U. S. Senate rubber hearing)

30. PAINTS, VARNISHES, LACQUERS, AND ENAMELS

6375 Strength of Surface Coatings. Henry Grinsfelder. *American Paint Journal*, v. 36, Mar. 24, 1952, p. 66-68, 70, 72, 74-79.

Some of the strength properties of film surfaces and film body were determined. Shows how those properties change as time of loading varies.

6376* Mildew On Paints—A Major Problem. Milton Goll, H. D. Snyder, and H. A. Birnbaum. *American Paint Journal*, v. 36, Mar. 31, 1952, p. 66-67.

Briefly discusses above problem. Outlines results of a survey of more than 600 discolored, painted homes, in various geographical areas. The results show that mildew was the major cause of the discolored or dirty appearance on 68% of these homes.

6377 Moisture as a Cause of Paint Failure. Robert I. Wray. *American Paint Journal*, v. 36, Mar. 17, 1952, p. 78, 80-81, 84.

Discusses the mechanism of paint blistering, painting practices, maintenance, and handling of lumber with special reference to the above.

6378 Modern Electrical Equipment in High Speed Paper Coating. *Canadian Chemical Processing*, v. 36, Mar. 1952, p. 80-82.

Describes above process at Alliance Paper Mills, Georgetown, Ontario, based on modification of a John Waldron Corporation Microjet Coater. Clay, latex, and casein form base for coatings which can be applied up to speeds of 600 fpm. with thickness variation of a few mμ. Photographs.

6379 Chlorinated Rubber Corrosion-Resistant Coatings. F. K. Shankweiler, G. N. Bruxelles, and R. E. Whitney. *Cor-*

30. *Paints, Varnishes, Lacquers, and Enamels*

rosion (Technical Section), v. 8, Apr. 1952, p. 130-139; disc., p. 139.

Numerous case histories of commercial use in varied maintenance problems where chemical resistance is essential establish the economic merit of above coatings. Among the fields discussed are acid plants, paper mills, water works, industrial machinery, sewage-disposal plants, and concrete construction protected by chlorinated rubber. Test panels and equipment are illustrated; data are tabulated.

6380 Water Resistance of Coatings Containing Nitrogenous Resins. Henry Grinsfelder. *Industrial and Engineering Chemistry*, v. 44, Mar. 1952, p. 563-568.

Presents results of a study undertaken to determine the effect of the nitrogen resin, the alkyd resin, the curing conditions, and the pigment on the water resistance of baked finishes applied to metal surfaces. Data are tabulated and graphed.

6381 Dielectric Characteristics of Pigment Dispersions. Andries Voet and Louis R. Suriani. *Journal of Colloid Science*, v. 7, Feb. 1952, p. 1-10.

A series of organic and inorganic colored pigments were dispersed in 3 vehicles, namely a medium-bodied linseed oil, a heavy mineral oil, and a limed resin—mineral oil varnish. The dielectric constants were determined at rest as well as when subjected to shear, in dispersions of different concentrations.

6382* Safety Precautions in Handling Industrial Solvents. F. A. Horsley. *Official Digest*, July 1951, p. 441-446.

Reviews safety precautions which should be observed in the paint, lacquer, and varnish industries.

6383* Studies in the Evaluation of Aluminum Pigment. Alex. Knoll. *Official Digest*, July 1951, p. 447-451.

Discusses the leafing and reflective properties of Al pigments. Includes data on paint composition, method of applications, and surfaces to which applied. Data are tabulated.

6384* Fume Control in the Paint and Varnish Industry. Part I. C. W. Selheimer and H .F. Bauman. **Analysis of Fumes by Selective Absorption. Part II.** C. W. Selheimer, William Muttera, Fred Zarasnik, and Rudolph Novak. *Official Digest*, Sept. 1951, p. 531-557.

The development and use of two procedures for analysis of fumes from paint and varnish manufacturing processes are presented. The first procedure was developed for the separation of compounds present in a fume sample into solubility classes. The other procedure was developed to yield data from which the effectiveness and cost of the common fume-disposal systems can be calculated for any given process. 14 ref.

6385* Shrinkage of Some Organic Film Forming Materials During Aging. L. L. Carrick and A. J. Permoda. *Official Digest*, Nov. 1951, p. 692-700.

Presents results of an investigation of the above. Numerous tables and graphs.

6386* Changes in the Infrared Spectra of Some Synthetic Oils As a Function of Drying Time. K. Adams, R. W. Auxier, and C. E. Wilson. *Official Digest*, Nov. 1951, p. 669-681.

Presents results of a detailed investigation of the above. Spectrograms are given.

6387* Hardness, Abrasion Resistance and Accelerated Weathering Tests on Pure Pigmented and Unpigmented Paint Vehicles. Ewin B. Kaiser and J. H. Coulliette. *Official Digest*, Nov. 1951, p. 724-739.

Results of the above investigation are tabulated and graphed.

6388* Refractive Index Measurements. R. E. Dunbar. *Official Digest*, Dec. 1951, p. 861-862.

The refractive indices of drying and semi-drying oils were employed as a means of identification of various oils and also for approximating the diene and iodine numbers of the oil.

6389* A Study of the Stability of Orange Pigments. H. B. Gough, chairman. *Official* Digest, Dec. 1951, p. 863-866.

Data on the above are tabulated.

6390* Preliminary Report on Effect of Spillage on Hot-Applied Coal-Tar Coatings. Carl Miller. *Oil and Gas Journal*, v. 50, Mar. 17, 1952, p. 294-295.

States that spillage of petroleum products has little effect on narrow-range enamels; wide-range enamels are not satisfactory. Relates the effect of gasoline, kerosene, and fuel oil on hot-applied, coal-tar enamels used for protection against corrosion.

6391 Whiting in the Paint Industry. G. E. Bessey and K. A. Lammiman. *Paint Manufacture*, v. 22, Mar. 1952, p. 85-90.

Describes manufacture of whiting from chalk, and reviews its application in the paint industry.

6392* Surface-Active Agents in Coatings. Charles Gardner. *Paint and Varnish Production*, v. 42, Mar. 1952, p. 28-29, 50. (A condensation.)

Surveys the above, their properties and applications.

6393* Paint Films on Synthetic Bonding Agents. (In Russian.) A. V. Pamfilov and E. G. Ivancheva. *Zhurnal Prikladnoi Khimii*, v. 24, July 1951, p. 742-747.

A study was made of the bonding strength of paints and lacquers containing various pigments. Results are discussed, tabulated, and charted.

6394* Calculation of the Viscosity of Lacquers. (In Russian.) I. R. Morozov. *Zhurnal Prikladnoi Khimii*, v. 24, Aug. 1951, p. 858-869.

An equation is developed for the above. Constants for the equation were determined for several materials over a range of conditions. Use of the equation is illustrated. Data are tabulated.

Books

6395 Paints. 70 pages. 1949. His Majesty's Stationery Office, London. (Selected Government Research Reports, v. 2.) (TP935 G79p)

Discusses extraction and uses of blood albumen, viscosity of paints and suspensions, temperature-sensitive paints, effect of surface treatment of brass and yellow metals on the adhesion of paint films with special reference to painting optical equipment, tests on special-base paints for protection of Mg alloys, ground flax shives as a substitute for pigment dyestuffs, effect of heating on corrosion resistance of chromate treated and painted Mg-alloy castings, and tests on phenyl mercury acetate as a fungicide in paints for the protection of Mg alloys.

See also:
5571 (coatings for petroleum-refinery corrosion control)
5676 (test methods for paint brushes)

31. AGRICULTURAL RESEARCH

6396* The Fundamentals Behind Fungicide Research. George L. McNew. *Agricultural Chemicals*, v. 7, Aug. 1952, p. 54-56, 143, 145-147, 149, 151-153, 155.

6397* Soil With Fallowing As Bacterial Fertilizer. (In Russian.) F. P. Krivykh. *Agrobiologia*, May-June 1951, p. 114-121.

Studies were made on the effect of fallowing on the increase of microorganisms in soil and on increased growth of wheat in such soils. Data are discussed and tabulated.

6398* Selectivity of Tomatoes to Conditions of Root Feeding (Fertilizing.) (In Russian.) V. Ia. Bykovskii. *Agrobiologia*, May-June 1951, p. 154-155.

A study was made of the growth of response of roots to granules of fertilizer placed at various depths in the soil. Data are discussed, tabulated, and illustrated.

6399 Coprogen, a New Growth Factor for Coprophilic Fungi. C. W. Hesseltine, C. Pidacks, A. R. Whitehill, N. Bohonos, B. L. Hutchings, and J. H. Williams. *Journal of the American Chemical Society*, v. 74, Mar. 5, 1952, p. 1362.

Outlines work which resulted in isolation of a new biologically active compound, designated as "Coprogen."

6400* Studies on the Nutrition of Pasture Plants in the South-West of Western Australia. III. The Effect of Sul-

phur on the Growth of Subterranean Clover *(Trifolium Subterraneum L.)*. R. C. Rossiter. *Australian Journal of Agricultural Research*, v. 3, Jan. 1952, p. 7-15.

11 references.

6401* The Fixation of Copper in Calcareous Soils. (In French.) Pierre Boischot and Pierre Quillon. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Feb. 11, 1952, p. 747-749.

Describes experiments on the above made to determine detrimental effects on plants. Results indicate that, in the amounts used in practice, for fungicidal purposes, there is no toxic effect on vegetation.

6402* "Active Manganese" of the Soil and Manganese Content of Vegetation. (In French.) Marcel Coppenet and Janine Calvez. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Feb. 18, 1952, p. 879-881.

The relation between Mn in the soil and Mn content in plants was investigated, especially for cereals. Includes table.

6403* The Question of Applying Poisons in the Form of Aerosols. (In Russian.) A. G. Amelin. *Doklady Vsesoiuznoi Ordena Lenina Akademii Sel'skokhoziastvennykh Nauk imeni V. I. Lenina*, v. 16, no. 8, 1951, p. 34-38.

The application of insecticides, etc., by means of fine sprays (drops less than 30μ in diam.) is discussed in relation to area covered and wind losses.

6404* Cobalt Requirements in the Feeding of Romanov Sheep. (In Russian.) V. V. Koval'skii and V. S. Chebaevskaia. *Doklady Vsesoiuznoi Ordena Lenina Akademii Sel'skokhoziastvennykh Nauk imeni V. I. Lenina*, v. 16, no. 8, 1951, p. 44-48.

Tests were made on the above. Data are tabulated and discussed.

6405* Shale Oil—Will Its Double Advantage Make It Become a New Farm Chemical? Dale W. Bohmont. *Farm Chemicals*, v. 115, Mar. 1952, p. 12-15.

Discusses possibilities of shale oil as a farm chemical because of its advantages, in large dosages, as a contact herbicide and in smaller quantities, as a plant stimulant.

6406* The Future of Phosphatic Fertilizers. Sven Nordengren. *Farm Chemicals*, v. 115, Mar. 1952, p. 17-18, 20.

Discusses the above with respect to the shortage of sulfur. Describes the following processes not requiring H_2SO_4, basic-slag process, nitric acid processes, high-temperature processes, and processes based on elementary phosphorus or phosphoric acid produced by thermal reduction. 10 ref.

6407* Root Distribution and Fertilizer Placement. *Farm Chemicals*, v. 115, Mar. 1952, p. 25, 27.

Discusses the above, studied with radioisotopes. Work was done on corn, cotton, tobacco, and peanuts.

6408* An Improved Technique for Estimating the Nitrifying Capacity of Soils. F. R. Bharucha and K. C. Sheriar. *Proceedings of the Indian Academy of Sciences*, v. 35, Sec. B, Jan. 1952, p. 28-32.

Concludes that, to judge the nitrifying power of a soil, all 3 products of nitrification should be estimated at short intervals and the experiment stopped on the day the nitrites completely disappear from the medium. This not only reduces the duration of experimentation, but also shows the true picture of nitrification of various soils. 12 ref.

6409* Microbioassay of Insecticides, With Special Reference to Aldrin and Dieldrin. Yun-Pei Sun and Jung-Yi Tung Sun. *Journal of Economic Entomology*, v. 45, Feb. 1952, p. 26-37.

Reveals certain important principles used in the microbioassay of toxicants, describes general procedures of carrying out such tests, compares different methods for evaluating results, and describes a method of estimating the sensitivity of each determination. 16 ref.

6410* Chlorinated Nicotine Derivatives as Insecticides. Simone Dormal, D. E. H. Frear, and L. E. Dills. *Journal of Economic Entomology*, v. 45, Feb. 1952, p. 73-75.

Addition of chlorine gas to nicotine alkaloid, nicotine hydrochloride, or nicotine dihydrochloride was investigated. Tests on aphids indicated that chlorination did not materially affect the toxicity of nicotine.

6411* Comparative Insecticidal Value of EPN, Methyl Ethyl Parathion, Methyl Parathion, and Parathion. G. T. Bottger and A. P. Yerington. *Journal of Economic Entomology*, v. 45, Feb. 1952, p. 131.

Data for various insects are tabulated and discussed.

6412* Effect of Iodine on the Longevity of Caged Bees. Joseph O. Moffett. *Journal of Economic Entomology*, v. 45, Feb. 1952, p. 135.

Tests were undertaken during the winter of 1949-50 to determine the effect of various concentrations of iodine on the longevity of caged adult bees. Results ranged from none to serious detriment.

6413* Insecticidal Control of Grasshoppers. R. L. Hanna and J. C. Gaines. *Journal of Economic Entomology*, v. 45, Feb. 1952, p. 139.

Data for 5 insecticides are tabulated.

6414* The Persistence of Crude Benzene Hexachloride in the Soil. H. R. Jameson and F. C. Peacock. *Journal of the Science of Food and Agriculture*, v. 3, Feb. 1952, p. 78-82.

Shows that residual benzene hexachloride (BHC) is a function of amount applied per acre and of time elapsing after application. A significant correlation was found between level of residual BHC and degree of tainting of potatoes grown in the same soil.

6415* Utilization of By-Products of Southern Agriculture. C. H. Fisher. *Journal of Southern Research*, v. 4, Mar.-Apr. 1952, p. 16-19.

Director of Southern Regional Research Laboratory reviews the above.

6416 Some Problems in Assessing the Toxicity of the "Organo-Phosphorus" Insecticides Towards Mammals. W. N. Aldridge and J. M. Barnes. *Nature*, v. 169, Mar. 1, 1952, p. 345-347.

Discusses and presents results of an investigation examining the mode of action of the above compounds and studying the biological properties of a number of them both *in vitro* and *in vivo*. 14 ref.

6417 Application of Paper Chromatography to the Separation and Identification of Auxins and Growth-Inhibitors. L. C. Luckwill. *Nature*, v. 169, Mar. 1, 1952, p. 375.

6418 Atmospheric Pollution and Plant Growth. J. K. A. Bleasdale. *Nature*, v. 169, Mar. 1, 1952, p. 376-377.

Deals with the direct effect of gaseous atmospheric pollution on plant growth, with emphasis on SO_2. Experimental data for rye are tabulated and illustrated.

6419 Estimation of Plant Growth Substances by Partition Chromatography. T. A. Bennet-Clark, M. S. Tambiah, and N. P. Kefford. *Nature*, v. 169, Mar. 15, 1952, p. 452-453.

Describes above technique for the characterization and separate quantitative estimation of growth promoters and inhibitors.

6420 Trace Elements in Biochemistry and Nutrition. Bert L. Vallee. *Nutrition Reviews*, v. 10, Mar. 1952, p. 65-68.

Numerous references scattered throughout the text.

6421* The Use of P^{32} in Studies on the Uptake of Phosphorus by Plants. Sigurd Larsen. *Plant and Soil*, v. 4, Feb. 1952, p. 1-10.

Describes a fertilizer experiment carried out in the summer of 1949 using 3 calcium phosphates labelled with P^{32}. 11 ref.

6422 The Chemical Characteristics and the Effect of Calcium Carbonate on the Manganese Status of Five Acid Organic Soils. J. C. Shickluna and J. F. Davis. *Quarterly*

31. *Agricultural Research*

Bulletin (Michigan State College Agricultural Experiment Station), v. 34, Feb. 1952, p. 303-319.

Presents a study of the above under greenhouse conditions, with pH 3.6-5.0, lime application 0-12 tons per acre, and using onions as the indicator crop. Tables and photographs.

6423* Research on Plant Growth Regulators. XIX. Structure/Activity. IV. Partially Hydrogenated Naphthoic Acids and α-Alkyl-Phenylacetic Acids. V. 2-Phenyl-Cyclopropane-1-Carboxylic Acids. (In English.) H. Veldstra and C. Van De Westeringh. *Recueil des Travaux Chimiques des Pays-Bas*, v. 70, Dec. 1951, p. 1113-1135.

41 references.

6424* Researches on Plant Growth Regulators. XXI. Structure/Activity. VI. Halogenated Benzoic Acids and Related Compounds. (In English.) H. Veldstra. *Recueil des Travaux Chimiques des Pays-Bas*, v. 71, Jan. 1952, p. 15-32.

25 references.

6425* Insect Repellents. Milton A. Lesser. *Soap and Sanitary Chemicals*, v. 28, Mar. 1952, p. 136-137, 141-142, 173.

Brief survey of development and present status of repellents for insects affecting man. Includes formulations. 57 ref.

6426* Aerosol Insecticides, Their Evaluation Against House Flies, Cockroaches. Part I. A. C. Miller, Arnold Mallis, and R. V. Sharpless. *Soap and Sanitary Chemicals*, v. 28, Mar. 1952, p. 143, 145, 147, 149.

Presents studies on the above. Tests with flies were made on such variables as test temperature, height and manner of discharge, delivery rate of TOTA dispensers, size of test populations, and type of official mortality determination. Tests with roaches show the relative effect of space and direct applications.

6427* Boron Content and Distribution of Boron in Different Plants. (In German.) Walter Otting. *Zeitschrift für Pflanzenernährung; Düngung; Bodenkunde*, v. 55(100), no. 3, 1951, p. 235-247.

Brief description of methods for determining boron in plants includes tables which give boron contents and distribution in a large number of different plants. 11 ref.

6428* Application of Isotopes in Biological and Agricultural Research. (In German.) G. Michael. *Zeitschrift für Pflanzenernährung; Düngung; Bodenkunde*, v. 55(100), no. 3, 1951, p. 247-257.

Discusses the production of isotopes and the various ways of using them, as tracers, for studying the movement and distribution of elements in plants. Data are tabulated.

Miscellaneous Publications

6429 Differential Thermal Analysis: A Conventional Method. P. L. Arens. *Fourth International Congress of Soil Science, Transactions*, v. 3, 1950, p. 26-27. (S590 I8t4)

Investigates various factors affecting the above, as applied to clay samples.

6430 Recent Advances in Clay Mineral Technology. Ralph E. Grim. *Fourth International Congress of Soil Science, Transactions*, v. 3, 1950, 44-54. (S590 I8t4)

Surveys the above. 63 ref.

6431 The Electrochemistry of the Clay Minerals in Relation to Pedology. C. E. Marshall. *Fourth International Congress of Soil Science, Transactions*, v. 1, 1950, p. 71-81. (S590 I8t4)

Presents a precise physicochemical discussion of the mean ionic environment of the plant root in the soil. 20 ref.

6432 Influence of the Potassium Fixation on the Hydration of Montmorillonite. Angel Hoyos de Castro. *Fourth International Congress of Soil Science, Transactions*, v. 2, 1950, p. 73-74. (S590 I8t4)

It was found that, with increasing fixation, the amount of exchangeable K and the amount of hydration water decreases; on the other hand, the retention strength between sheets becomes so great that it is hardly possible to separate them.

6433 Electrokinetic Behaviour of Clay Minerals. H. E. Bergna. *Fourth International Congress of Soil Science, Transactions*, v. 3, 1950, p. 75-80. (S590 I8t4)

Investigates the above. An explanation of the different electrokinetic behaviors of clays, based on crystalline structure, is suggested. The importance of chemical composition on illite and montmorillonite is pointed out. Using an approximate formula, experimental values for the charge density are compared with those calculated from the exchange capacity of each mineral, through certain assumptions about the origin of the double layer and the fixing mechanism of exchange ions on clays.

6434 The Fate of Complex Organic Compounds in Soil. A. G. Norman. *Fourth International Congress of Soil Science, Transactions*, v. 3, 1950, p. 100-102. (S590 I8t4)

Briefly discusses the above, pointing out that in most cases the rates at which they are applied are so low that no serious interference in soil transformation occurs.

6435 Soil and Plant Studies on Manganese Toxicity in Swedes in Relation to Applied Phosphates. T. Walsh, J. D. Golden, and G. A. Fleming. *Fourth International Congress of Soil Science, Transactions*, v. 3, 1950, p. 115-119. (S590 I8t4)

Data on the above are tabulated. "Swedes" appear to be a root vegetable related to mangel beets. 11 ref.

6436 Sorption of Copper From Acid Systems by Kaolinite and Montmorillonite. R. G. Menzel and M. L. Jackson. *Fourth International Congress of Soil Science, Transactions*, v. 1, 1950, p. 125-128. (S590 I8t4)

The above study was limited to inorganic exchange systems. Exchange reactions of Cu, K, and H ions with kaolinite and montmorillonite were carried out in acid systems in order to characterize the sorption of Cu as hydroxy cupric ions in the absence of precipitation of cupric hydroxide.

6437 Manganese Mobilization and Fertility of Tropical Volcanic Ash Soils. H. A. Middelburg. *Fourth International Congress of Soil Science, Transactions*, v. 2, 1950, p. 136-137. (S590 I8t4)

It has been shown by several investigators that the solubility of Mn in the soil depends largely on the soil reaction and on the reduction-oxidation status. Results of investigation show waterlogging increases the amount of soluble Mn, whereas the solubility of Mn is decreased in actively oxidizing soils. Data are tabulated.

6438 Influence of Alternate Wetting and Drying on Potassium and Magnesium Fixation and Base Exchange Capacity of Synthetic Aluminium and Iron Silicates. A. Malquori and L. Wiklander. *Fourth International Congress of Soil Science, Transactions*, v. 1, 1950, p. 141-146. (S590 I8t4)

The effect of alternate wetting and drying on the fixation of K and Mg, and on the exchange capacity of precipitated Al- and Fe-silicates of various composition was investigated. Tables and graphs.

6439 The Relation of Molybdenum Deficiency to the Acid Soil Complex. William Plant. *Fourth International Congress of Soil Science, Transactions*, v. 2, 1950, p. 148-151. (S590 I8t4)

Presents results of an investigation on the above. Data are tabulated.

6440 A Survey of Biological Nitrogen Fixation in Relation to the World Supply of Nitrogen. H. L. Jensen. *Fourth International Congress of Soil Science, Transactions*, v. 1, July 24-Aug. 1, 1950, p. 165-172. (S590 I8t4)

33 references.

6441 Some Aspects of the Carbon and Nitrogen Metabolisms of Soil. H. Lees. *Fourth International Congress of Soil Science, Transactions*, v. 1, July 24-Aug. 1, 1950, p. 184-186. (S590 I8t4)

Briefly mentions the above.

6442 On the Dependence of the Amount of Organic Phosphorus on the Carbon Content in Soil. Armi Kaila. *Fourth International Congress of Soil Science, Transactions*, v. 1, July 24-Aug. 1, 1950, p. 191-192. (S590 I8t4)

Describes results of an investigation of the above.

6443 Use of P^{32} in Measurement of Fertilizer Effectiveness Under Field Conditions. S. B. Hendricks and L. A. Dean. *Fourth International Congress of Soil Science, Transactions*, v. 1, 1950, p. 221-223. (S590 I8t4)

Describes results of experiments on the above. Effectiveness of phosphate fertilization for an annual crop appears to depend chiefly upon adequate phosphate supply in early stages of growth.

6444 Manganese Toxicity in Beans. Marie P. Löhnis. *Fourth International Congress of Soil Science, Transactions*, v. 1, 1950, p. 226. (S590 I8t4)

Discusses the symptoms induced by Mn in toxic amounts.

6445 Analysis of Plants for Potassium in Soil. H. J. Atkinson, R. C. Turner, and A. J. Maclean. *Fourth International Congress of Soil Science, Transactions*, v. 1, 1950, p. 226-228. (S590 I8t4)

Experiments on the above show that heavier textured soils make K available to plants at a more rapid rate than those of lighter texture, even though larger amounts were removed by the crop. Data are tabulated.

6446 Plant Analysis as a Means of Evaluation of Chemical Soil Tests. F. van der Paauw. *Fourth International Congress of Soil Science, Transactions*, v. 1, 1950, p. 232-235. (S590 I8t4)

Discusses various factors affecting the above.

6447 Differential in the Nutrient Content of Calcium Accumulating Cotton Plants and the Silicon Accumulating Wheat Plants. H. P. Cooper, W. R. Paden, and J. H. Mitchell. *Fourth International Congress of Soil Science, Transactions*, v. 1, 1950, p. 236-239. (S590 I8t4)

Discusses those factors which determine differences in the above. Data are tabulated.

6448 Behavior of Copper in the Soil. (In German.) A. Hasler. *Fourth International Congress of Soil Science, Transactions*, v. 1, 1950, p. 249-251. (S590 I8t4)

Discusses the importance and function of Cu in the soil. The form in which Cu is found in the soil, and the rate and mechanism of its distribution, are indicated. Amount needed and effects of Cu salts on various types of soil are outlined.

6449 Hydrogen in Soils in Its Relation to Mineral Content of Plants. A. Mehlich and J. Fielding Reed. *Fourth International Congress of Soil Science, Transactions*, v. 1, 1950, p. 251-254. (S590 I8t4)

Results indicating the effect of H ions from HCl on the release of metal cations as related to degree of saturation are discussed and tabulated.

6450 On the Relative Contents of Plant Nutrients in Crops. F. Steenbjerg. *Fourth International Congress of Soil Science, Transactions*, v. 1, 1950, p. 254-258. (S590 I8t4)

Presents results of chemical analysis to determine the ratio between the supplied and adsorbed quantities of a particular plant nutrient. Data are graphed.

Books

6451 Smut Fungi. George William Fischer. 387 pages. 1951. Ronald Press Co., New York. (Z5356.F97 F52s)

A guide and quick introduction to the literature on the biology and control of some 330 species of smut fungi and the diseases they cause.

6452 Spraying, Dusting, and Fumigating of Plants; Principles and Applications. Rev. Ed. Walter S. Hough and A. Freeman Mason. 726 pages. 1951. MacMillan Co., New York. (SB951 H81s)

Part I contains a brief history of the development of pest control, including discussions of the more important insecticides, fungicides, herbicides, and other materials used in protecting crops. Formulas for making them, advice on their use, equipment, and principal methods are described. Part II is a systematic treatment of all the important plant pests and diseases. The crops covered include orchard and bush fruits, and vegetables of all kinds, as well as tobacco and cotton. Hundreds of photographs, drawings, charts, and diagrams clarify the text. References follow each chapter.

6453 Phosphorus Metabolism; A Symposium on the Role of Phosphorus in the Metabolism of Plants and Animals. Vol. I. Wm. D. McElroy and Bentley Glass, editors. 762 pages. 1951. John Hopkins Press, Baltimore. (QP171 M15p)

Presents 42 papers by different authors which represent current research and interest in specific areas of the field of phosphate metabolism.

6454 Field Crops. Howard C. Rather and Carter M. Harrison. 446 pages. 1951. McGraw-Hill, New York. (SB185 R18f2)

Designed primarily for beginning college courses in Farm Crops or Agronomy, this text deals with the distribution, planting, management, harvesting, and use of the major field crops. Specific chapters deal with broad subject-matter areas such as soil conservation, crop improvements, and forage and pasture management.

6455 Manual on Phosphates in Agriculture. Vincent Sauchelli. 176 pages. 1951. Davison Chemical Corp., Baltimore, Md. (S647 S85m)

Chapters are as follows: Phosphorus; Geology of Phosphorus; Mining of Phosphate Rock; Processing of Phosphate Rock; Granulation; Fixation of Phosphates; Rock Phosphate Versus Superphosphate; Losses and Replenishment; Phosphorus in Nutrition; Radiophosphorus; Miscellaneous Data on Phosphates; and Other Phosphates. Diagrams, tables, maps, photographs, etc.

6456 Diseases of Cereals and Grasses in North America; (Fungi, Except Smuts and Rusts.) Roderick Sprague. 538 pages. 1950. Ronald Press Co., New York. (SB608.G8 Sp74d)

A comprehensive source of information concerning the fungi occurring on members of the grass family, a field in which there is said to be still a great need for fundamental study. 80-page bibliography.

6457 An Introduction to the Anatomy of Seed Plants. Ernest L. Stover. 274 pages. 1951. D. C. Heath and Co., Boston. (QK641 St76i)

Presents a continuous story of the growth of the leaves, stems, and roots of seed plants from the fertilized egg. Study of development of the embryo and seedling from the fertilized egg has been found to be a very useful introduction to the mature patterns of the hereditary types of both the external and internal structures of leaves, stems, and roots. Numerous micrographs.

6458 Economics of American Agriculture. Walter W. Wilcox and Willard W. Cochrane. 594 pages. 1951. Prentice-Hall, New York. (HD1761 W64e)

Gives a comprehensive picture of the economics of American agriculture. Presents in an integrated fashion the important work of historical and statistical description and analyzes the relationships that have been developed by agricultural economists in the past 50 years.

6459 Carbon Dioxide Fixation and Photosynthesis. 342 pages. 1951. Academic Press, New York. (QK882 So13c)

Presents 21 papers by different authors covering various aspects of the above. Papers were read at a Symposium of the Society for Experimental Biology held at Sheffield in July 1950. Paper references.

6460* Directory of Organization and Field Activities of the Department of Agriculture. 315 pages. 1950. U. S. Dept. of Agriculture, Washington. (Agriculture Handbook 12.) (Directory Shelf.)

See also:

5607 (microdetermination of benzene hexachloride)
5609 (bioassay of lindane)
5612 (organic insecticide separation from tissues)
5668 (organic matter in soils)
5669 (organic carbon in soils)
5983 (thermal analysis of clay minerals)
5986 (thermal analysis of clay minerals)
5990 (potassium fixation of clays)
5992 (physicochemical properties of soil clays)
6098 (food and food products—book)
6734 (agriculture and the world's hunger problem)
6769 (Forest Products Research Guide)

32. PHYSICS

6461* The Three-Dimensional Question of Diffraction of Monochromatic Electromagnetic Waves. (In Russian.) D. Z. Avazashvili. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 1, 1952, p. 29-32.

A mathematical treatment of the above.

6462* The Question of Strength Criteria. (In Russian.) G. I. Gurevich. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 11, 1952, p. 245-248.

Presents a theoretical discussion of equations describing the relationships of stress and strain in a uniform isotropic body.

6463* Range of Measurement With a Series of Rayleigh Discs Arranged in a Criss-Cross Plane for Increased Measurement Sensitivity. (In German.) Ludwig Keidel. *Akustische Beihefte*, no. 1, 1951, p. 34-36.

The Rayleigh discs of very small diameter used in connection with absolute calibrations in ultrasonics are very insensitive. Points out that a number of equal-size discs, if assembled on a fine-mesh grid, may be used for creating a multiple of the torque of each individual disc. Diagrams.

6464 Microwave Resonance Absorption in Antiferromagnetic Materials. Louis R. Maxwell. *American Journal of Physics*, v. 20, Feb. 1952, p. 80-85.

Microwave resonance absorption in Cr_2O_3, MnO, MnF_2, and CoO above and below the paramagnetic-antiferromagnetic transition temperature is reviewed. The nature of the crystal-structure changes associated with changes in magnetic structure are given for comparison. With the exception of CoO, alignment of magnetic ions to form the antiferromagnetic configuration results in deformation along an axis perpendicular to sheets of magnetic ions having parallel spins. Similar results are reported for magnetite.

6465 The Adsorption of Gases on Metal Filaments, Films, and Single Crystals. Albert D. Crowell. *American Journal of Physics*, v. 20, Feb. 1952, p. 89-98.

Discusses concepts involved in the study of adsorption of gases on solids. Particular stress is placed on the problem of uniform surfaces. An historical study follows which is specifically concerned with metal filaments and evaporated films and surfaces of metal single crystals, both considered as approximations to ideal surfaces for adsorption measurements.

6466 The Fundamental Character of the Photometric System. Gordon L. Walls. *American Journal of Physics*, v. 20, Mar. 1952, p. 145-151.

It is shown that photometric quantities and units are not psychophysical entities, as officially claimed, since they express no relationships between subjective intensity and true visual stimulus magnitudes. It is concluded that since the lumen is expressible as an absolute number of quanta per sec., there is no intrinsic subjective element in the photometric system and the system is not psychophysical but "100% physical." 18 ref.

6467 Atomic Spectroscopy and Separated Isotopes. J. R. McNally, Jr. *American Journal of Physics*, v. 20, Mar. 1952, p. 152-160.

Advantages in the use of separated isotopes in atomic spectroscopy for determination of nuclear moments, and for studies of the isotope-shift phenomena, are discussed. Illustrations of spectra are given for Hg, U, and Sm. In addition, a summary is given of 22 so-called problem nuclei, i.e., those naturally occurring isotopes for which the nuclear moments are completely uncertain. Concluding remarks are made on such problems as evaluation of the absolute magnitude of isotope shifts, the role of "forbidden transitions" in isotope spectra, and the potential future value of spectroisotopic assay techniques. 69 ref.

6468* Effect of the Temperature-Dependent Fermi Limit on the Conductivity of Semiconductors. (In German.) K. W. Böer. *Annalen der Physik*, ser. 6, v. 10, Jan. 1, 1952, p. 32-48.

Shows that thermally excited dark conductivity of CdS is determined mainly by the electron concentration in the conduction band; and that the position of the Fermi limit decisively influences the total internal work function, which in turn determines the electron concentration. Includes diagrams, graphs, and tables. 18 ref.

6469* Temperature Dependence of the Dark Conductivity of Cadmium Sulfide. (In German.) K. W. Böer. *Annalen der Physik*, ser. 6, v. 10, Jan. 1, 1952, p. 20-31.

Experiments performed according to Frerichs' method show the importance of eliminating boundary-layer effects when evaluating internal effects. Within a range up to 700°K., the concentration of the perturbed levels suffices to cause impurity conduction. Includes diagrams, graphs, and tables. 10 ref.

6470* A Review of Unsteady Aerodynamics of Potential Flows. I. E. Garrick. *Applied Mechanics Reviews*, v. 5, Mar. 1952, p. 89-91.

Limited chiefly to theoretical nonsteady wing characteristics. 12 ref.

6471* The Photovoltaic Effect in Natural Lead Sulphide. R. Lawrance. *Australian Journal of Scientific Research*, ser. A, v. 4, Dec. 1951, p. 569-578.

Australian samples of natural PbS were used as radiation detectors in the near infrared. The nature of the photovoltaic effect was investigated and the sensitivity of some cells measured. The electrical properties of bulk samples were measured. Results are compared with similar measurements given by other authors for thin PbS films, and a close correlation established between them.

6472* A Simple Correspondence Between the Solutions of Two Equations With Partial Derivitives, and Its Application to the Approximate Study of Transsonic Flow. (In French.) Paul Germain and Maurice Fenain. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Feb. 4, 1952, p. 592-597.

A mathematical analysis, including graphical interpretation.

6473* High-Frequency Ionized Gas "Cell." (In French.) Madeleine Chenot. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Feb. 4, 1952, p. 608-610.

Presents a short theoretical discussion of the possibilities of the above.

6474 Cadmium Chlorophosphate Phosphors. Robert W. Wollentin, C. K. Lui Wei, and Rudolph Nagy. *Journal of the Electrochemical Society*, v. 99, Apr. 1952, p. 131-136.

An investigation of cadmium chlorophosphate phosphor was undertaken to determine the possibilities of its use in production of fluorescent lamps. Studies were made of the effect of substitutions of cations for Cd on the output, emission, excitation, and interlattice spacing of the phosphor. Acceptable commercial lamps can be made with a number of modifications of cadmium chlorophosphate phosphor.

6475 Calcium Zinc Silicate Phosphor. Rudolph Nagy, C. K. Lui Wei, and R. W. Wollentin. *Journal of the Electrochemical Society*, v. 99, Apr. 1952, p. 137-139.

Describes the preparation and properties of a new Ca-Zn silicate phosphor activated with Pb.

6476 The Zinc Silicate Phosphors Fluorescing in the Yellow and Red. H. G. Pfeifer and G. R. Fonda. *Journal of the Electrochemical Society*, v. 99, Apr. 1952, p. 140-143.

The spectral emission at room temperature and at 80°K. of yellow and red fluorescing zinc orthosilicates prepared in various ways was determined. The glassy state of the red phosphor was confirmed. The yellow phosphor was found to have some degree of crystallinity, but its spectral emission was affected only slightly by the degree of crystallinity as determined by X-ray diffraction.

6477 The Function of Oxygen in Zinc Sulfide Phosphors. F. A. Kroeger and J. A. M. Dikhoff. *Journal of the Electrochemical Society*, v. 99, Apr. 1952, p. 144-154.

Discusses and presents results of an investigation of the above. 34 ref.

6478 Zinc-Magnesium Oxide and Zinc-Magnesium Sulfide Phosphors. Arthur L. Smith. *Journal of the Electrochemical Society*, v. 99, Apr. 1952, p. 155-158.

Zinc-magnesium oxide phosphors were briefly investigated,

and procedures developed for producing highly efficient phosphors containing no intentional additions of either activator or flux. Reports work done to establish the existence of a system of Zn-Mg sulfide luminescent materials. 18 ref.

6479 The Excitation Spectra of Various Silicate Phosphors. Alexander J. Oszy. *Journal of the Electrochemical Society*, v. 99, Apr. 1952, p. 159-163.

Describes the excitation spectra of a number of silicate phosphors when irradiated by ultra-violet energy. Phosphors described are Mn-activated Zn-Be silicate, Pb- and Mn-activated Ca silicate, Ba silicate activated by Pb, and Ba silicate activated by Pb and modified by substitution of Mg. 11 ref.

6480 Boundary-Displacement Magnetic Recording. H. L. Daniels. *Electronics*, v. 25, Apr. 1952, p. 116-120.

First published description of a new method of magnetic tape and drum recording that is analogous to variable-area sound-on-film recording. Initial application is for analysis of transient waveforms up to 100,000 cps. Audio uses appear promising. Diagrams and illustrations.

6481* Theory of Turbulent Flow and Its Application to Flow Resistance and Heat Transfer. D. Johnson. *Engineers' Digest*, v. 13, Feb. 1952, p. 51-54. (From *Teknisk Ukeblad*, v. 98, Sept. 20, 1951, p. 675-681.)

Presents new formula for velocity distribution in the transition layer. This expression is then used for determination of the flow-resistance coefficient. The resultant equation gives close agreement with both Blasius' and Nikuradse's relations and is valid for Reynolds numbers between 10^4 and 10^6. For heat-transfer calculations, a new expression is obtained for Nusselt's number, which is also valid for Prandtl numbers below 10.

6482* Clarification of the Internal Mechanism of Magnetic Recording. (In German.) K. Schwarz. *Frequenz*, v. 6, Feb. 1952, p. 37-44.

Explains the physical changes that occur during the magnetization of a permanent magnet and processes occurring during recording on magnetic tape. Model experiments are described and possible nonlinear distortions indicated. Diagrams, graphs, and photographs.

6483* The Use of Phosphorescent Material for the Detection of Ultrasonic Vibrations. (In French.) L. Petermann. *Helvetica Physica Acta*, v. 24, Dec. 31, 1951, p. 596-599.

Describes experiments for the purpose of determining the distribution of ultrasonic energy on the radiating surface of an ultrasonic emitter. Experimental method is indicated; applications are discussed.

6484* Photoelectric Effect in Cs-Ga, Cs-In, and Cs-Tl Photocathodes. (In German.) N. Schaetti, W. Baumgartner, and Ch. Flury. *Helvetica Physica Acta*, v. 24, Dec. 31, 1951, p. 609-613.

Experimental data on above are graphed and tabulated.

6485* Behavior of Cs-Sb Photocathodes at Different Temperatures. (In German.) N. Schaetti and W. Baumgartner. *Helvetica Physica Acta*, v. 24, Dec. 31, 1951, p. 614-619.

Describes experiments on the relative sensitivity of photoelectric cells at room temperature and at very low temperatures. Data are graphed and a diagram illustrates design of the photoelectric cell used.

6486* Dielectric Properties of Substances of the Perovskite Type. (In German.) H. Granicher. *Helvetica Physica Acta*, v. 24, Dec. 31, 1951, p. 619-622.

Discusses structural and dielectric studies of several titanates, zirconates, cerates, aluminates, and scandates made to determine the physical and microstructural properties required for a perovskite substance to be ferroelectric and also the effect of deformation on dielectric behavior. Dielectric constants and temperature coefficients are tabulated and graphed.

6487 Flow of Plastics Materials in Pipes. Bengt O. A. Hedstrom. *Industrial and Engineering Chemistry*, v. 44, Mar. 1952, p. 651-656.

The importance of the flow curve (the rate of shear-shear stress relationship) in interpreting non-Newtonian flow data is stressed. A simple criterion is proposed, distinguishing between laminar and turbulent flow of plastics. Curves and nomogram are given, permitting accurate calculations of pressure drops in a straightforward, simple manner.

6488 Heat Flow Problems; Outline of the Relaxation Method of Calculation. L. F. Daws. *Iron & Steel*, v. 25, Feb. 1952, p. 65-68; Mar. 1952, p. 102-105.

Develops a particular example of a steady-state heat-flow problem in which temperature distribution in a cylindrical ingot heated to constant temperature over its curved surface while cooling to ambient temperature at the other. Technique for the solution of the unsteady state heat-flow problem is explained in detail. 27 ref.

6489* Determination of Elastic Wing Aerodynamic Characteristics. William J. Gaugh and Joseph K. Slap. *Journal of the Aeronautical Sciences*, v. 19, Mar. 1952, p. 173-182.

The basic aeroelastic integral equation is formulated by treating the wing as a tapered cantilever beam mounted normal to its straight elastic axis. By means of an iterative process, a series solution is obtained for the aeroelastic change in angle-of-attack distribution. Wind-tunnel data for a full-scale swept-back wing are presented and agree well with results calculated using the present method. 10 ref.

6490* A Theory of the Direct and Inverse Problems of Compressible Flow Past Cascade of Arbitrary Airfoils. Chung-Hua Wu and Curtis A. Brown. *Journal of the Aeronautical Sciences*, v. 19, Mar. 1952, p. 183-196.

The theory is illustrated with solutions of both inverse and direct problems of compressible flow past typical turbine cascades of highly cambered thick blades. The results compared well with experimental data. The method is directly applicable to two-dimensional flows on cylindrical surfaces in axial turbomachines, and can be extended to two-dimensional flows on arbitrary surfaces of revolution in radial and mixed-flow turbomachines. 25 ref.

6491* A Preliminary Study of Reynolds Number Effects on Base Pressure at M=2.95. Seymour M. Bogdonoff. *Journal of the Aeronautical Sciences*, v. 19, Mar. 1952, p. 201-206.

Presents results of above study. Includes diagram of test set-up and series of schlieren photographs.

6492 Unsteady-State Separation Performance of Cascades. I. Elliott W. Montroll and Gordon F. Newell. *Journal of Applied Physics*, v. 23, Feb. 1952, p. 184-194.

Concerns exact solution of nonlinear differential equations which describe the time-dependent behavior of multistage cascade separating processes for separation of 2 very similar molecular species. The Rayleigh separation law is postulated for each stage. Includes brief discussion of linearization of a class of nonlinear 2nd-order partial differential equations. 16 ref.

6493 Phenomena Associated With the Flight of Ultra-Speed Pellets. Part II. Spectral Character of Luminosity. W. C. White, John S. Rinehart, and William A. Allen. *Journal of Applied Physics*, v. 23, Feb. 1952, p. 198-201.

A study of the spectroscopic character of luminous trails generated by ultra-speed metallic pellets. Presents spectrograms and discusses their features.

6494 The Structure of Tetragonal Tungsten Trioxide. W. L. Kehl, R. G. Hay, and D. Wahl. *Journal of Applied Physics*, v. 23, Feb. 1952, p. 212-215.

Presents results of a study of the above, a new form. Diagrams and X-ray diffraction patterns.

6495 Considerations Regarding the Distribution of Radiation Damage in Matter Bombarded by Light Ions and a Method of Making It Uniform. Philip Schwed and Gerhart Groetzinger. *Journal of Applied Physics*, v. 23, Feb. 1952, p. 234-236.

Provides a quantitative estimate of the spatial distribution of the radiation damage produced by monoenergetic ions. Describes a simple method whereby uniform radiation damage can be produced in a relatively thick sample by the use of ions whose range equals the thickness of the sample. Discusses, specifically, 20-Mev. deuterons impinging on Cu.

32. *Physics*

6496 Studies in Newtonian Flow. III. The Dependence of the Viscosity of Liquids on Molecular Weight and Free Space (in Homologous Series). Arthur K. Doolittle. *Journal of Applied Physics*, v. 23, Feb. 1952, p. 236-239.

Adapts the free-space concept to a case where both temperature and molecular weight vary. The molecular-weight range of the n-paraffins illustrative of this case is limited to 100-240. Tables.

6497 The Measurement of Ultrasonic Attenuation in Solids by the Pulse Technique and Some Results in Steel. R. L. Roderick and Rohn Truell. *Journal of Applied Physics*, v. 23, Feb. 1952, p. 267-279.

Pulse techniques were extended and refined to obtain dependable measurements over the range of 5-50 megacycles. Understanding of relative importance of beam spreading, geometrical boundaries, and method of coupling was improved. Coupling by means of water buffer and direct mounting is discussed in detail. Attenuation measurements were made on Cr-Mo steel. Data are tabulated and graphed; photomicrographs. 18 ref.

6498 Phenomena Associated With the Flight of Ultra-Speed Pellets. Part III. General Features of Luminosity. John S. Rinehart, William A. Allen, and W. C. White. *Journal of Applied Physics*, v. 23, Mar. 1952, p. 297-299.

Ultra-speed pellets of the lighter metals such as Al and Mg generate intensely luminous trails when fired through air. A pronounced characteristic of the luminous trails is the intermittent manner in which the light is emitted. Brightness, luminous output, and temperature of the trail generated by an Al pellet were measured. Includes photographs of pellets in flight.

6499 Mechanisms of Positive and Negative Corona in Hydrogen and Argon Between Coaxial Cylindrical Electrodes Over an Extended Pressure Range. Eugene J. Lauer. *Journal of Applied Physics*, v. 23, Mar. 1952, p. 300-307.

Mechanisms in the corona discharge from a fine Pt wire at a positive potential along the axis of a hollow Ni cylinder were investigated by using the oscilloscope to analyze the pulses caused by α-particles passed through the low field region parallel to the wire. Positive-wire d.c., measurements were taken in H_2 and A at several pressures. Includes graphs and discharge traces. 15 ref.

6500 Radiofrequency Field Quenching of Ultraviolet Excited Phosphors. T. Miller and K. N. Fromm. *Journal of Applied Physics*, v. 23, Mar. 1952, p. 373.

A graph illustrates the dependence of quenching action upon the magnitude of the r.f. potential applied across the phosphor cell for Cu- and Ag-activated Zn-Cd sulfide phosphors.

6501 Shock Wave Formation in a Shock Tube. George A. Lundquist. *Journal of Applied Physics*, v. 23, Mar. 1952, p. 374-375.

Measurements of shock speed vs. diaphragm pressure ratio taken at increasing distances from the diaphragm are charted and discussed.

6502* Effect of High Energy Cathode Rays on the Catalase Activity of *Micrococcus Pyogenes* Var. *Aureus*. Bernard E. Proctor, Margaret T. Coleman, and Samuel A. Goldblith. *Journal of Bacteriology*, v. 63, Mar. 1952, p. 337-339.

10 references.

6503 Long-Lifetime Phosphorescence and the Diffusion Process. P. Debye and John O. Edwards. *Journal of Chemical Physics*, v. 20, Feb. 1952, p. 236-239.

The long-lifetime phosphorescence of certain, easily oxidizable organic compounds in rigid media at the temperature of liquid N_2 was found to decay by an inverse power function of the time. Decay kinetics of this type have been observed previously in inorganic phosphors. Employing the diffusion equation and the observed rate law, a distribution function for electrons in the solid media is derived. Data from the experiments are discussed in relation to this theoretical treatment.

6504 The Velocity of Sound in Electrolytic Solutions. Sidney Barnartt. *Journal of Chemical Physics*, v. 20, Feb. 1952, p. 278-279.

A relationship between velocity of sound in electrolytes and concentration is derived for extremely dilute solutions from the Debye-Hückel limiting law. The equation fits the observed data at higher concentrations, when the theoretical coefficients are replaced by empirical constants.

6505 The Origin of the Ultrasonic Absorption in Liquids. II. Karl F. Herzfeld. *Journal of Chemical Physics*, v. 20, Feb. 1952, p. 288-289.

Excess absorption in nonassociated liquids is explained by the same mechanism responsible for molecular absorption in gases, namely, slow exchange for energy between internal and external degrees of freedom. Rate-of-energy exchange was calculated for benzene and found to be 3 times too rapid. 10 ref.

6506 The Location of the Activator in Fluorescent ZnS. Cu. F. A. Kroger. *Journal of Chemical Physics*, v. 20, Feb. 1952, p. 345-346.

Critically discusses several recent papers on the above.

6507* Study of the Perturbation of Spectral Rays by Pressures Up to 1200 Kg./Cm². (In French.) Stephane Robin. *Journal de Chimie physique et de Physico-Chimie biologique*, v. 49, Jan. 1952, p. 1-19.

Presents results of an extensive theoretical study of the above. Includes graphs, diagrams, and tables. 116 ref.

6508* Electron Transfers in Solutions and at Electrodes. Part 2. (In French.) *Journal de Chimie physique et de Physico-Chimie biologique*, v. 49, Jan. 1952, p. C43-C144.

Consists of a series of 12 papers in French and English presented at a meeting of the Société de Chimie Physique on May 8-10, 1951, including an introduction by René Audubert.

6509* Influence of Molecular Mass of Solid Walls on the Heat Exchange With Gases. (In French.) E. Sänger. *Métaux: Corrosion—Industries*, v. 27, Jan. 1952, p. 44-45.

Discusses the above with respect to the interior walls of jet engines, and the exterior walls of airplanes subjected to wind action. Methods for the protection of the walls are indicated.

6510* Nuclear Reactor Catalog. H. S. Isbin. *Nucleonics*, v. 10, Mar. 1952, p. 10-16.

First concise tabulation of declassified details of reactors already in operation and those in advanced stages of design and construction. 44 ref.

6511* Utilization of Waste Heat From the British Experimental Pile. J. Walker and H. J. Grout. *Nucleonics*, v. 10, Mar. 1952, p. 58-60.

Installation of a heat exchanger so designed that it does not affect the operation of BEPO adversely has made it possible to use part of the 6000 kw. removed by the pile-cooling system for heating laboratory buildings. Includes diagrams and graphs.

6512 The Electro-Optic Effect in Uniaxial Crystals of the Dihydrogen Phosphate (XH_2PO_4) Type. IV. Angular Field of the Electro-Optic Shutter. Bruce H. Billings. *Journal of the Optical Society of America*, v. 42, Jan. 1952, p. 12-20.

When voltage is applied to a basal section of uniaxial crystal of the type XH_2PO_4, the crystal becomes biaxial. Between crossed polarizers it can be considered, then, to act as a light valve. The angular field of view is limited by the natural retardation of the crystal. Discusses methods by which this natural retardation can be minimized or effectively canceled.

6513 The Specification of Fluorescing Materials. John E. Tyler. *Journal of the Optical Society of America*, v. 42, Feb. 1952, p. 141.

Theoretical, mathematical treatment.

6514 The Infrared Properties of Gold Smoke Deposits. Louis Harris and John K. Beasley. *Journal of the Optical Society of America*, v. 42, Feb. 1952, p. 134-140.

An interpretation of the above is presented together with new experimental results. This interpretation is based on application of classical electromagnetic theory. The gold-smoke de-

posits are assumed to interact with infrared radiation as if they were sheets of an essentially uniform material which is characterized by an average electrical conductivity small compared to that of ordinary metals. The electrical conductivity of gold-black deposits was found to be about 10^{-5} times that of bulk gold, and the volume percent of gold in a gold-black deposit was found to be about 0.2%.

6515* The Magnetic and Electrical Properties of Ferroxcube Materials. J. J. Went and E. W. Gorter. *Philips Technical Review*, v. 13, Jan. 1952, p. 181-193.

Includes tabular and graphical data. 21 ref.

6516* The Natural Radioactivity of Rubidium. S. C. Curran, D. Dixon, and H. W. Wilson. *Philosophical Magazine*, ser. 7, v. 43, Jan. 1952, p. 82-92.

Presents results of investigations of the above. 26 ref.

6517* The Luminescence of Basic Magnesium Arsenate Activated by Manganese. (In English.) M. Travnicek, F. A. Kröger, Th. P. J. Botden, and P. Zalm. *Physica*, v. 18, Jan. 1952, p. 33-42.

Extensive spectral data on the above are charted and tabulated.

6518 A Determination of the Rate of Emission of Spontaneous Fission Neutrons by Natural Uranium. D. J. Littler. *Proceedings of the Physical Society*, v. 65, sec. A, Mar. 1, 1952, p. 203-208.

By comparison with a calibrated neutron source, the total rate of emission of primary neutrons in the Graphite Low Energy Experimental Pile (British GLEEP) was determined.

6519 Matrix Elements and Operator Equivalents Connected With the Magnetic Properties of Rare Earth Ions. K. W. H. Stevens. *Proceedings of the Physical Society*, v. 65, sec. A, Mar. 1, 1952, p. 209-215.

An account is given of methods used to determine the matrix elements of crystal field potentials with particular reference to rare-earth ions. Emphasis is laid on the importance of Wigner coefficients in such problems and the idea of using equivalent angular momentum operators is developed. For convenience in applying the results, tables of matrix elements are included.

6520 Single Contact Lead Telluride Photocells. A. F. Gibson. *Proceedings of the Physical Society*, v. 65, sec. B, Mar. 1, 1952, p. 196-214.

The photosensitivity and time constant of above cells was determined by the total current at the contact point, as expected from barrier theory. The variation in barrier height with temperature and time was also determined.

6521 Lead Sulphide Rectifier Photocells. A. F. Gibson. *Proceedings of the Physical Society*, v. 65, sec. B, Mar. 1, 1952, p. 214-216.

Presents results of an investigation of properties of the above.

6522 Double Surface Lead Sulphide Transistor. P. C. Banbury. *Proceedings of the Physical Society*, v. 65, sec. B, Mar. 1, 1952, p. 236.

Briefly presents results of research on the above which shows that transistor action is not solely a surface phenomenon.

6523 Photosensitive Neon-Argon Discharge Tubes in Photometry. T. J. Dillon. *Proceedings of the Physical Society*, v. 65, sec. B, Mar. 1, 1952, p. 236-238.

Presents results of experiments using tubes of the neon-indicator-tube type in relaxation-oscillation circuits, on the relationship between the period of oscillation and the striking potential when the tube is irradiated. Further investigations were made to see if the tubes could be used satisfactorily as light-sensitive devices for quantitative photometric work.

6524* The Boundary Layer Nature of Shock Transition in a Real Fluid. G. S. S. Ludford. *Quarterly of Applied Mathematics*, v. 10, Apr. 1952, p. 1-16.

Outlines usual approach to so-called shock phenomena in compressible fluids. Presents new approach based on a system of partial differential equations which govern the motion of a viscous, heat-conducting, compressible fluid.

6525 Problems of Cross-Viscosity. I. Braun and M. Reiner. *Quarterly Journal of Mechanics and Applied Mathematics*, v. 5, Mar. 1952, p. 42-53.

Reiner's equation of a general viscous liquid, which differs from Stokes' equation by a quadratic term defining a "coefficient of cross-viscosity," is integrated for the cases of a cylindrical rod rotating in a liquid, the rotating coaxial-cylinder viscometer, the tube viscometer, and the parallel plate-torsional viscometer, thus providing criteria for experiments to decide whether the "centripetal effect" in certain liquids is totally or partially due to cross-viscosity. 20 ref.

6526* Two-Dimensional Rotational Flow at High Mach Number Past Thin Aerofoils. F. A. Goldsworthy. *Quarterly Journal of Mechanics and Applied Mathematics*, v. 5, Mar. 1952, p. 54-63.

A theory of flow at high Mach number past thin aerofoils is developed and a critical survey of previous papers given. 11 ref.

6527* The Direct Use of Green's Method for Supersonic Potentials. J. O'Keeffe. *Quarterly Journal of Mechanics and Applied Mathematics*, v. 5, Mar. 1952, p. 82-92.

Presents results of an investigation of Green's method for linearized steady supersonic motion past a thin wing.

6528* Separation of the Boundary Layer at a Slightly Blunt Leading Edge in Supersonic Flow. O. Bardsley and W. A. Mair. *Philosophical Magazine*, ser. 7, v. 43, Mar. 1952, p. 344-352.

Presents results of a study of above by schlieren photography. Separation occurs when the Reynolds number, based on thickness of leading edge, is greater than about 1000. Diagrams and schlieren photographs (shown between p. 374-375.)

6529 Neutron Transmission Cross Sections in the Kilovolt Region. Carl T. Hibdon, Alexander Langsdorf, Jr., and Robert E. Holland. *Physical Review*, ser. 2, v. 85, Feb. 15, 1952, p. 595-600.

Above were measured with about 2 kev. resolution in the range 2-25 kev., and to high energies in some cases. Measurements at the lower energies were made possible by a collimator and shield around the counters, which reduced background, and by the high efficiency obtained by many counters embedded in an array in a paraffin moderator. Resonances were observed in Na, Ti, V, Mn, Fe, Co, and Ni.

6530 Semiconductivity and Diamagnetism of Polycrystalline Graphite and Condensed Ring Systems. S. Mrozowski. *Physical Review*, ser. 2, v. 85, Feb. 15, 1952, p. 609-620.

Analyzes results obtained from studies of electric resistivity as a function of temperature, sample preparation, and other available evidence, leading to a clarification of electronic processes in the class of substances extending from condensed-ring molecular solids to polycrystalline graphite.

6531 Motion of a Ferromagnetic Domain Wall in Fe_3O_4. John K. Galt. *Physical Review*, ser. 2, v. 85, Feb. 15, 1952, p. 664-669.

Experiments were made on a sample of Fe_3O_4 cut from a single crystal in such a way that its ferromagnetic domain pattern includes an individual domain wall whose motion can be studied. The data are discussed in terms of recent theoretical developments.

6532 Ion Clustering. Stanley Bloom and Henry Margenau. *Physical Review*, ser. 2, v. 85, Feb. 15, 1952, p. 670-673.

Kinetic theory is employed in investigating the extent to which polarizable molecules attach themselves to slowly moving ions in a gas, the underlying picture being that commonly used in deriving the barometric equation, i.e., the aggregation of molecules in a constant field of force.

6533 The Scattering of 0.5-Mev Circularly Polarized Photons in Magnetized Iron. Forrest P. Clay and Frank L. Hereford. *Physical Review*, ser. 2, v. 85, Feb. 15, 1952, p. 675-676.

Forward-direction Compton electrons from 2 magnetized Fe foils were detected by 2 thin stilbene crystals covered by Al foil. Scintillations were recorded by a fast coincidence circuit, and rates were measured for each of the 4 possible configurations of the magnetic fields. Data from 12 independent runs

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and the difference in coincidence rates for the indicated field configurations are presented.

6534 The Drift Mobility of Electrons in Silicon. J. R. Haynes and W. C. Westphal. *Physical Review*, ser. 2, v. 85, Feb. 15, 1952, p. 680-681.

Mobility of electrons injected into p-type Si was determined by measuring transit times between emitter and collector points with single-crystal rods. A schematic diagram of the circuit used successfully with Si is shown.

6535 Ferromagnetic Resonance in Single Crystals of Cobalt-Zinc Ferrite. Tosihiko Okamura and Yuzo Kojima. *Physical Review*, ser. 2, v. 85, Feb. 15, 1952, p. 690.

Single crystals of Co-Zn ferrite were grown and their ferromagnetic resonance observed at 9310 Mc. from room temperature to the Curie point.

6536 Relaxation Effects in Ferromagnetic Resonance. N. Bloembergen and R. W. Damon. *Physical Review*, ser. 2, v. 85, Feb. 15, 1952, p. 699.

By investigating the ferromagnetic resonance effect at high levels of microwave power, saturation of the electronic spin system was observed. Provides a means of determining spin-lattice relaxation time, which is the characteristic time describing the transfer of energy from the spin system to the crystal lattice. Samples were single crystals of Ni ferrite, made into spheres about 0.5 mm. diam. Microwave power was supplied to the rectangular cavity by a magnetron.

6537 Activation of LiI Crystal Phosphors. W. Bernstein and A. W. Schardt. *Physical Review*, ser. 2, v. 85, Mar. 1, 1952, p. 919-920.

LiI crystals were grown with different activators and tested for pulse height and resolution with thermal neutrons. A collimated beam ⅛ in. in diam. was used for exploring different parts of the crystals. Data are charted and discussed.

6538 Tin Activation of LiI. James Schenck and R. L. Heath. *Physical Review*, ser. 2, v. 85, Mar. 1, 1952, p. 923-924.

During testing the effect of various activators in LiI, it was found that strong luminescence occurred under ultraviolet excitation when LiI was activated by tin. In order to determine its response to slow neutrons, crystals of this phosphor containing about 0.1 mole % SnI_2 were exposed to uncollimated neutrons from an unshielded Po-Be source. Results are charted and discussed.

6539 Adiabatic Study of the 128°C. Transition in Barium Titanate. Shepard Roberts. *Physical Review*, ser. 2, v. 85, Mar. 1, 1952, p. 925-926.

Results are briefly outlined.

6540 Interactions of Remote Impurity Centers in Phosphors. H. W. Leverena and D. O. North. *Physical Review*, ser. 2, v. 85, Mar. 1, 1952, p. 930-931.

Evidence is presented which indicates that luminescence centers formed by Mn impurity atoms (ions) in rhombohedral Zn_2SiO_4:Mn interact over several interatomic spacings. The interactions apparently can decrease the thermal activation energy for making nonradiative transitions from the excited state, without greatly affecting the energy difference of radiative transitions. Data are charted.

6541 The Stopping Power of a Metal for Charged Particles. David Pines. *Physical Review*, ser. 2, v. 85, Mar. 1, 1952, p. 931.

Theoretical, mathematical analysis.

6542 Zinc as an Acceptor in Germanium. W. C. Dunlap, Jr. *Physical Review*, ser. 2, v. 85, Mar. 1, 1952, p. 945-946.

Reports what seems to be convincing evidence that Zn can act as an acceptor element in Ge. The evidence is based upon two sorts of experiments. Data are charted.

6543* Industrial Applications of Semi-Conductors. I. H. K. Henisch. *Research*, v. 5, Mar. 1952, p. 101-107.

A simplified and non-mathematical account is given of conditions resopnsible for the characteristic bulk properties by which semiconductors are distinguished from metals and insulators. Special reference is made to bulk phenomena which are important for the understanding of transistor action. 16 ref. (To be continued.)

6544* Ultrasonics — A Tool for Biological Research. William J. Thaler. *Research Reviews* (Office of Naval Research), Jan. 1952, p. 4-12.

Presents a study of the effects of ultrasonic waves on the refractive media of the eye. The ultimate goal was to study production of cataracts in the eye and the possibility of clearing them by means of ultrasonic irradiation. Illustrates what can be accomplished by application of ultrasonics to biological research.

6545* S. I. Vavilov's Book "Microstructure of Light." (In Russian.) V. A. Fabrikant. *Uspekhi Fizicheskikh Nauk*, v. 44, May 1951, p. 117-135.

Presents lengthy summary of above book, which has 3 main parts: Experimental Investigations of Light Fluctuations by Visual Methods; Premises and Certain Conclusions on the Elementary Study of Light Interference; and Properties of Light Emitted by Absorbing Media. A new concept of optics is presented. Includes graphs and diagrams.

6546* Photoelectro-Optical Intensifiers. (In Russian.) B. P. Kozyrev. *Uspekhi Fizicheskikh Nauk*, v. 44, June 1951, p. 173-199.

A triple-cascade system for measuring changes of light flow is described. An investigation was made on galvanometers suitable for use with this equipment. Data are tabulated, charted, and illustrated. 11 ref.

6547* New Light Source, Using the Phenomenon of Electroluminescence. (In Russian.) *Uspekhi Fizicheskikh Nauk*, v. 44, June 1951, p. 277-282.

A new lamp that converts electrical energy directly into visual light is described. Radiation from a mercury discharge is used with a luminescent coating on the surface of the bulb. Graphs and diagrams.

6548* D. I. Mendeleev's Periodic System of the Elements and Certain Problems of Atomic Physics. (In Russian.) I. P. Selinov. *Uspekhi Fizicheskikh Nauk*, v. 44, Aug. 1951, p. 511-526.

A detailed discussion of periodicity and atomic structure including isotopes, structure of atomic nuclei, and new radioactive elements. 22 ref.

6549 An Introduction to High Vacua in Nuclear Physics. A. S. Baxter. *Vacuum*, v. 1, July 1951, p. 185-190.

The need for high vacua in the study of nuclear physics and the consequent parallel development of these subjects is outlined. The nature of nuclear reactions and the vacuum requirements of associated instruments are then described.

6550 Vacuum-Powder Insulation for Low Temperatures. L. L. Katan. *Vacuum*, v. 1, July 1951, p. 191-202.

Reviews development of vacuum-powder insulation. The importance of thermal insulation at very low temperatures is explained and emphasized. The theory of thermal conduction of porous materials is briefly considered in terms of the variables involved, with particular reference to pressure. Recent experiments at low temperatures on 4 typical insulants over a range of 760-0.001 mm. Hg are described, and the results correlated theoretically. Outlines industrial applications of the method. 13 ref.

6551* Thermal Radiation of Bodies of Different Shapes in Free Flowing Liquids and Gases. (In German.) Hermann Senftleben. *Zeitschrift für angewandte Physik*, v. 3, Oct. 1951, p. 361-373.

Shows how to calculate effects of variables on above phenomenon. Proposes general formulas for the most frequent shapes—the vertical plane, and the horizontal and vertical cylinder within the free flow. Agreement of theoretical and experimental findings is indicated; other related calculations are discussed. 16 ref.

6552* The Frequency Effect of the Magnetic After Effect in Sintered Cores. (In German.) Th. Einsele and F. Baur. *Zeitschrift für angewandte Physik*, v. 3, Oct. 1951, p. 373-376.

Describes measurements within a very broad frequency region

on the above for the purpose of establishing its complex permeability curves. The results are charted and discussed.

6553* Active Components of Ultrasonic Generation by Means of Ferromagnetic Powders. (In German.) Hans Heinrich Rust and Peter Pilz. *Zeitschrift für angewandte Physik*, v. 3, Oct. 1951, p. 379-382.

Describes investigations on use of various ferromagnetic powders for above purpose. Powders containing silicon seem to show a particularly large effect, and can thus be used for continuous ultrasonic generation. Other details of the investigation are indicated; results are tabulated and charted.

6554* Electrical Conductivity and Dielectric Strength of Thin Glass Films. (In German.) Gunther Glaser. *Zeitschrift für angewandte Physik*, v. 4, Jan. 1952, p. 12-16.

Describes experiments on above, results of which show that electrical conductivity of thin layers of glass corresponds to interference conduction with its known dielectric anomalies, that dielectric strength of glass is not directly related to its conductivity, that current passage distorts the electrical field, and that dielectric strength drops with increasing temperatures. Diagrams and graphs. 31 ref.

Miscellaneous Publications

6555 Note on Wall Interference in Two-Dimensional Flow at Subsonic and Transonic Speeds. G. Drougge. Aeronautical Research Institute of Sweden, Report 40, 1951, 12 pages. (TL526 A82r)

Some aspects of the problem of wind-tunnel interference are discussed. The investigation, which is restricted to 2-dimensional flow at zero angle of attack, deals first with Mach Number distribution on a profile between walls as computed by means of linearized theory. The distribution is computed for different wall distances. Next, the process of extrapolation was investigated. Finally, use is made of the transonic approximation to obtain a similarity law for flow around profiles between walls and to determine variation of drag coefficient with free-stream Mach Number and wall distance.

6556 Quarterly Progress Report No. 3, Solid-State and Molecular Theory Group. Massachusetts Institute of Technology, Jan. 15, 1952, 31 pages. (QC1 M38q)

Consists of the following sections: "The Effect of Chemical Combination on the Internal Conversion in Tc," J. C. Slater; "A Soluble Problem in Energy Bands," J. C. Slater; "Note on the One-Electron Approximation in the Theory of Molecules and Crystals," P. O. Lowdin; "Solution of the One-Dimensional Wave Equation," P. O. Lowdin; "Self-Consistent Fields for Atoms," G. W. Pratt, Jr.; "Energy Bands in Solids," R. H. Parmenter; "The Crystalline Field in Chrome Alum," W. H. Kleiner; "Molecular Orbital Calculations for the Methane Molecule," G. F. Koster; "Theory of Molecular Oxygen," A. Meckler; "The Internal Field in a Cubic Unit Cell," H. C. Schweinler; "Superlattice Stability," H. C. White; "Heisenberg's Model of Ferromagnetism," R. Kikuchi; and "Resonant Frequency of a Perturbed Cylindrical Cavity With Germanium as a Center Post," Hilda H. T. Hsieh.

6557 Investigation of Fretting by Microscopic Observation. Douglas Godfrey. National Advisory Committee for Aeronautics, Report 1009, 1951, 10 pages. (TL521 Un3r)

An experimental investigation, using microscopic observation and color motion photomicrographs of the action, was conducted to determine the cause of fretting. Glass and other noncorrosive materials, as well as metals, were used as specimens. A simple apparatus vibrated convex surfaces in contact with stationary flat surfaces at frequencies of 120 cycles or less than 1 cycle per sec., an amplitude of 0.001 in., and a load of 0.2 lb. Fretting of clean nonmetals and metals occurred readily, and glass microscope slides and steel balls provided an excellent method for visual studies.

6558 Analytical Investigation of Some Three-Dimensional Flow Problems in Turbomachines. Frank E. Marble and Irving Michelson. National Advisory Committee for Aeronautics, Technical Note 2614, Mar. 1952, 109 pages. (TL570 Un3t)

29 references.

6559 Some Remarks on an Approximate Method of Estimating the Wave Drag Due to Thickness at Supersonic Speeds of Three-Dimensional Wings With Arbitrary Profile. Kenneth Margolis. National Advisory Committee for Aeronautics, Technical Note 2619, Feb. 1952, 9 pages. (TL570 Un3t)

14 references.

6560 A Solution of the Navier-Stokes Equation for Source and Sink Flows of a Viscous Heat-Conducting Compressible Fluid. Robert V. Hess. National Advisory Committee for Aeronautics, Technical Note 2630, Feb. 1952, 60 pages. (TL570 Un3t)

Above is given for the case of constant total-flow energy. The nature of the general solutions for flow with arbitrary Prandtl number and with heat addition is discussed. 24 ref.

6561 Inviscid Flow About Airfoils at High Supersonic Speeds. A. J. Eggers, Jr., and Clarence A. Syvertson. National Advisory Committee for Aeronautics, Technical Note 2646, Mar. 1952, 65 pages. (TL570 Un3t)

A theoretical, mathematical analysis.

6562 Implication of the Transport Equation for the Semiempirical Treatment of Shields. Philip Schwed. National Advisory Committee for Aeronautics, Technical Note 2647, Mar. 1952, 31 pages. (TL570 Un3t)

The semiempirical method of dealing with shields by treating them as composed of layers is revised and extended by taking the angular distribution of the radiation into account and by making use of the transport equation. The method is illustrated by consideration of the effect upon neutrons of a thick nonabsorbing shield of high atomic weight. The physical significance of the new variables thus introduced is determined.

6563 Supersonic Conical Flow. Stephen H. Maslen. National Advisory Committee for Aeronautics, Technical Note 2651, Mar. 1952, 32 pages. (TL570 Un3t)

A method is described for the solution of the nonlinear equations for supersonic conical flow. As an illustration, the flow about a triangular wing with supersonic edges is presented. 24 ref.

6564 Critical Study of Integral Methods in Compressible Laminar Boundary Layers. Paul A. Libby, Morris Morduchow, and Martin Bloom. National Advisory Committee for Aeronautics, Technical Note 2655, Mar. 1952, 40 pages. (TL570 Un3t)

A number of the more promising integral methods for solving approximately the compressible, laminar, boundary-layer equations were investigated in order to determine a computationally convenient and sufficiently accurate method of calculating boundary-layer characteristics. Comparison of the results is made with those of known exact solutions for skin-friction and heat-transfer coefficients, velocity profiles, velocity derivatives, and especially laminar-boundary-layer stability. From this comparison, it was found that the Karman-Pohlhausen method with a 6th-degree polynomial as the velocity profile is the most suitable for many practical purposes. 24 ref.

6565 Laminar Boundary Layer Over Flat Plate in a Flow Having Circular Streamlines. Artur Mager and Arthur G. Hansen. National Advisory Committee for Aeronautics, Technical Note 2658, Mar. 1952, 28 pages. (TL570 Un3t)

Mathematical analysis. 15 ref.

6566 Experimental Investigation of the Turbulent-Boundary-Layer Temperature-Recovery Factor on Bodies of Revolution at Mach Numbers From 2.0 to 3.8. Howard A. Stine and Richard Scherrer. National Advisory Committee for Aeronautics, Technical Note 2664, Mar. 1952, 20 pages. (TL570 Un3t)

6567 Influence of Plastic Flow on the Electrical and Photographic Properties of the Alkali Halide Crystals. Frederick Seitz. "A Symposium on the Plastic Deformation of Crystalline Solids." Office of Technical Services, U. S. Department of Commerce, 1950, p. 37-43. (QC191 M48s)

Discusses the above as it affects the electrical conductivity, darkenability, and bleaching effect on alkali-halide crystals. 26 ref.

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6568 The Analogy Between Elastic Solids and Viscous Liquids. V. G. Szebehely and D. H. Pletta. Engineering Experiment Station, Virginia Polytechnic Institute, Series 80, Nov. 1951, 24 pages. (*Bulletin*, v. 45, no. 1.) (TN21 V81b)

A mathematical development. 21 ref.

Books

6569 Cosmical Electrodynamics. H. Alfven. 237 pages. 1950. Clarendon Press, Oxford, England. (QB461 AL29c)

Attempts to trace systematically the influence of electric forces in astrophysical and geophysical problems.

6570 The Theory of Isotope Separation as Applied to the Large-Scale Production of U^{235}. Ed. 1. Karl Cohen. 165 pages. 1951. McGraw-Hill, New York (National Nuclear Energy Series, Manhattan Project Technical Section, Div. III, v. 1B.) (TP156.17 C66t)

Chapters cover ideal cascades, square cascades, equilibrium time of a square cascade, determination of cascade constants, the control problem, centrifuges, and other separation methods. Also includes 5 appendices on roots of a transcendental equation, equilibrium time of square cascades, the hold-up function, Rayleigh distillation, and properties of concurrent 2-phase elements.

6571 Applied Atomic Energy. K. Fearnside, E. W. Jones, and E. N. Shaw. 156 pages. 1951 Temple Press, Ltd., London. (TK9145 F31a)

Provides the basic knowledge of nuclear physics necessary to an understanding of the advantages to be derived from the above and discusses a large number of applications to different fields of pure and applied science, including radiographic techniques and the use of isotopes. Also discusses the prospects of useful power generation and problems of international control.

6572 The Classical Theory of Fields. L. Landau and E. Lifshitz. 354 pages. 1951. Addison-Wesley Press, Cambridge, Mass. (QC670 L23t2tr)

A systematic presentation of the theory of electromagnetic and gravitational fields, using the theory of relativity as a basis.

6573 Physik dünner Schichten. Teil I. Herstellung, Dickemessung, Optische Eigenschaften. (The Physics of Thin Layers. Part I. Formation, Measurement of Thickness, and Optical Properties.) Herbert Mayer. 326 pages. 1950. Wissenschaftliche Verlagsgesellschaft M.B.H., Stuttgart, Germany. (QC191 M45p)

Discusses processes of formation and methods for measuring above layers. The latter include mechanical, electrical, chemical, and optical methods. Optical methods, which are most important, include measurement by interference, intensity, and polarization. Remainder of book considers electromagnetic theory of optical phenomena and presents methods for determining optical constants of thin layers, and for increasing or decreasing reflectivity of thin layers.

6574 Techniques Générales du Laboratoire de Physique. (General Techniques of Physics Laboratories.) 2 vols. J. Surugue, editor. 433 and 336 pages. 1947. Centre de Documentation de C.N.R.S., Paris. (QC53 S78t)

Consists of articles by experts on 18 different groups of physical techniques and apparatus.

6575 Advances in Applied Mechanics. Vol. II. Richard von Mises and Theodore von Kármán, editors. 233 pages. 1951. Academic Press, New York. (TA350 Ad95)

Consists of the following articles, each including comprehensive references: "On the Statistical Theory of Isotropic Turbulence," Th. von Kármán and C. C. Lin; "The Laminar Boundary Layer in Compressible Flow," G. Kuerti; "Bending of Curved Tubes," R. A. Clark and E. Reissner; "Recent Developments in Inverse and Semi-Inverse Methods in the Mechanics of Continua," P. F. Nemenyi; and "Theory of Filtration of Liquids in Porous Media," P. Ya. Polubarinova-Kochina and S. B. Falkovich.

6576 The Acceleration of Particles to High Energies. 58 pages. 1950. Institute of Physics, London. (QC786 In7a)

After an introduction by M. L. E. Oliphant, the following papers are presented: "The Cyclotron," J. Rotblat; "Betatrons and Synchrotrons," F. K. Goward; "Electrostatic Generators," E. S. Shire; and "Linear Accelerators," E. S. Shire. A 14-page discussion is included. Numerous references.

6577 Internal Ballistics. 311 pages. 1951. Philosophical Library, New York. (UF820 H91i)

Deals with the ballistic properties of propellants and the motion of the projectile in the gun. 16-page bibliography.

See also:

5200 (biaxial pressing of powders)
5406 (ponderomotive force in simple metals)
5421 (breakdown mechanisms in high vacuum)
5429 (thermally produced acceptors in Ge)
5434 (conductivity of monovalent metals)
5436 (thermal conductivity of pure metals at low temperature)
5534 (plastic flow and fracture—book)
5724 (pulse-amplitude analyzer)
5962 (oxide ceramics as permanent magnets)
6007 (discharge of gases from liquids in laminar flow)
6102 (ultrasonics in chemical engineering)
6107 (antiferromagnetism in magnetite)
6129 (ultrasonic velocity and molecular structure)
6207 (paramagnetism in Cu acetate)
6356 (statistical and quantum mechanics)
6381 (dielectric properties of pigment dispersions)
6664 (Fourier treatment of optical processes)
6665 (photographic sensitivity vs. temperature)

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6578* The Problem of Measuring Losses in Steels. (In Russian.) M. A. Rozenblat. *Doklady Akademii Nauk SSSR*, new ser., v. 81, Dec. 21, 1951, p. 1059-1062.

A system for measuring and calculating electrical losses in steel cores subjected to alternating current is described and discussed in theoretical and mathematical terms.

6579* Determination of the Degree of Efficiency of Transformers. (In German.) F. Heiles. *Archiv fur technisches Messen*, v. 193, Feb. 1952, p. 25-28.

Describes method used to determine the above by measuring the loss rather than the direct output of the transformer. Types of losses, measuring of no-load and short-circuit values, as well as interpretation of the measurements, are indicated. Data are charted.

6580* Complex Feedback in Its Effects Upon the Phase and Amount of Amplification in Alternating-Current Amplifiers. (In German.) W. Oesterlin. *Archiv fur technisches Messen*, v. 193, Feb. 1952, p. 39-42.

Discusses the possibility of compensation of the phase and amount of the amplification with the aid of complex feedback in dependence on the temperature. Practical application is indicated.

6581* Photoelectric Amplifiers; New Developments. (In German.) Alfred Schaller. *Archiv fur technisches Messen*, v. 193, Feb. 1952, p. 43-46.

Reviews the above on the basis of the literature. 18 ref.

6582* An Analysis of the Galvanometer Amplifier and Its Response to Alternating Electromotive Forces and Mechanical Vibrations. R. G. Wylie and A. F. A. Harper. *Australian Journal of Scientific Research*, ser. A, v. 4, Dec. 1951, p. 560-568.

A system representative of most practical galvanometer amplifiers is analyzed and response of the system to alternating e.m.f.'s and to mechanical vibration determined.

6583* Transit Time Oscillations in Triodes. O. H. Critchley and M. R. Gavin. *British Journal of Applied Physics*, v. 3, Mar. 1952, p. 92-94.

Oscillations which are critically dependent on anode voltage were obtained over a wavelength range of 6-20 cm. in disk-seal triodes. The oscillations occur when the cathode-grid transit

time is about 1.25 times the alternating period. They are shown to be closely analogous to the negative resistance oscillations obtained in diodes.

6584* A Method of Designing a Compensated Solenoid Giving Approximately Uniform Field. T. A. Heddle. *British Journal of Applied Physics*, v. 3, Mar. 1952, p. 95-97.

Describes a method of calculating the design of a solenoid with any number of compensating end coils to produce an approximately uniform magnetic field along a large portion of the solenoid length. Design of a solenoid with 2 end coils at each end is given in a numerical example, and its estimated performance compared with experimental results.

6585 Predicting Magnetic Amplifier Control Curves. Henry Lehmann. *Electrical Engineering*, v. 71, Apr. 1952, p. 311. (To be published in *AIEE Transactions*, v. 70, 1951.)

Describes a method for the above.

6586 Electronic Regulation of Metallic Rectifiers. J. A. Potter. *Electrical Engineering*, v. 71, Apr. 1952, p. 328. (To be published in *AIEE Transactions*, v. 71, 1952.)

Presents a functional electronic regulating circuit applied to regulated rectifiers.

6587 Electrostatic Neutralizer Discharge and Safety Characteristics. Robin Beach. *Electrical Engineering*, v. 71, Apr. 1952, p. 329-334. (To be published in *AIEE Transactions*, v. 71, 1952.)

Evaluates various types of static neutralizers with test data showing their comparative effectiveness to assist engineers in selecting suitable antistatic equipment.

6588 Improved Cathode-Ray Tube for Application in Williams Memory System. W. E. Mutter. *Electrical Engineering*, v. 71, Apr. 1952, p. 352-356.

Design features and electrical characteristics of a new cathode-ray tube which was developed specifically for electrostatic storage applications are described. Particular attention is given to the spot size, deflection defocusing, "spill" characteristics, screen blemishes, signal output, and compromises made to achieve optimum over-all design.

6589 An Electronic Analogue for an Economic System. O. J. M. Smith and H. F. Erdley. *Electrical Engineeing*, v. 71, Apr. 1952, p. 362-366.

Describes macrodynamical economic system which is simulated with electronic circuits to study the effects of various parameters on stability. Included in the circuit are the delay between investment of money and the production of goods, time constant of depreciation, distribution of manufactured goods, increase of capital goods, and national consumption.

6590* Hermetic Seals. R. O. McIntosh. *Electrical Manufacturing*, v. 49, Apr. 1952, p. 120-123, 328, 330, 332, 334.

Describes advantages and limitations of various methods for making sealed electrical connections to components that are protected from the atmosphere. Covers plastic and inorganic materials and the joining of insulator substances to metals. Gives design data. Presented as part of a continuing editorial program. 12 ref.

6591* Sources of Electrical Wire Standards. Kemp Haythorne. *Electrical Manufacturing*, v. 49, Apr. 1952, p. 140-141, 310, 312.

Presents cross-indexing data sheets that answer some pertinent questions on the above. Table I is an alphabetical list of wire and cable types correlated with applicable standards and sources. Table II provides an alphabetical list of principal sources affecting standards, including full name, address, symbol, and a brief summary of standards issued.

6592* Two Bridges for Measuring Valve Parameters. G. Smith. *Electronic Engineering*, v. 24, Mar. 1952, p. 127-129.

Describes the above which are capable of measuring the 3 parameters of a triode or pentode to within 3%. Considers their application in deriving nonlinear equations. Diagrams and graphs.

6593* A Single Valve Delayed Pulse Generator. P. A. V. Thomas. *Electronic Engineering*, v. 24, Mar. 1952, p. 132-133.

Describes a time-base-driven-square-wave generator using a square wave drive as a means of generating a series of pulses in equipment. Circuit diagrams.

6594* Distributed Amplification. A. Cormack. *Electronic Engineering*, v. 24, Apr. 1952, p. 144-147.

The basic principle of the distributed amplifier is briefly outlined. Design details are given of 2 amplifiers having flat frequency-response curves extending from lf. to 170 Mc. per sec. One, a single stage amplifier, has a gain of 18 db., the other a two-stage amplifier, also produces a gain of 28 db. A final stage giving an output impedance of 75 ohms is also discussed.

6595* An Emission Stabilizer With D.C. Heater Supply. D. E. Brown. *Electronic Engineering*, v. 24, Apr. 1952, p. 171-172.

The unit described provides a d.c. heater supply of 20 watts suitable for use with an ion source. Feedback is incorporated to stabilize the total emission from the heater, and a variable electron accelerator voltage is provided. Stability of emission current is ±0.4% for a line supply change of ±10%. A.c. modulation of the electron current is 0.2%. Circuit diagram.

6596* A Transductor-Controlled Stabilizer for Medium Direct Currents. H. G. Smith. *Electronic Engineering*, v. 24, Apr. 1952, p. 173-175.

6597 Printed Circuits Used in Development Models. K. H. Barney and S. Machlin. *Electronics*, v. 25, Apr. 1952, p. 106-108.

Difficulties encountered in transferring circuitry from developmental breadboard to production model are eliminated by starting with simple, inexpensive, cross-grid wiring cards similar to finished assembly. Connections are dip-soldered to improve product and save time. Illustrated.

6598 Recent Developments in Klystrons. Russell H. Varian. *Electronics*, v. 25, Apr. 1952, p. 112-115.

Television transmitters, phase-coherent radars, multiplexed relay systems, and induction heaters are some of the expanding applications of klystrons. Renewed development work promises to bring widespread usage of klystrons in other untapped fields. Schematic diagrams and illustrations.

6599 Direct-Reading Instrument Measures Tube Noise. A. van der Ziel. *Electronics*, v. 25, Apr. 1952, p. 136-137.

Four-tube circuit provides rapid and accurate determination of tube noise resistance in a single operation that can be performed by unskilled personnel. Auxiliary controls and meters permit plotting of tube characteristics as a concomitant application.

6600 2-Channel Rectangular Pulse Generator. Troy D. Graybeal. *Electronics*, v. 25, Apr. 1952, p. 141-143.

Battery-operated generator delivers rectangular voltage pulses from two main output channels. Pulses from each channel are adjustable in amplitude from 0 to 80 volts in 3 decade ranges and adjustable in time duration from 25 microsec. to 7.5 millisec. in 3 ranges. Circuit diagram.

6601 Driftless D-C Amplifier. Frank R. Bradley and Rawley McCoy. *Electronics*, v. 25, Apr. 1952, p. 144-148.

Chopper and auxiliary a.c. amplifier provide continuous balancing to counteract drift. Input current is zero because all input-stage grid current goes through feedback resistor. Two-page table gives input and output networks for use with amplifier to generate a variety of complex transfer functions for the summation operation in analog computers. Circuit diagrams.

6602 Choosing Pentodes for Broad-Band Amplifiers. John R. Whyte. *Electronics*, v. 25, Apr. 1952, p. 150.

Gain-bandwidth products for pentodes are easy to calculate individually, but a graphic comparison of these broad-band, amplifier-tube figures of merit yields useful information. Such a comparison is presented in chart form.

6603 British Commercial Radar. Marvin Hobbs. *Electronics*, v. 25, Apr. 1952, p. 174-175, 178, 182, 186.

Description includes circuit diagrams.

33. *Electricity and Electronics*

6604 Miniature High-Capacity Battery Cells. Richard R. Clune. *Electronics*, v. 25, Apr. 1952, p. 216, 220, 222.

Describes and diagrams the above, developed for the Signal Corps. Details of component parts and electrical characteristics are given.

6605 Parallel-Output Push-Pull Circuit. John W. Flowers. *Electronics*, v. 25, Apr. 1952, p. 152, 154.

With above circuit, each tube in a push-pull pair delivers an output signal voltage and current which combine in parallel in the primary of the output transformer.

6606* A Multi-Voltage Universal Motor. A. Novazzotti. *Engineers' Digest*, v. 13, Feb. 1952, p. 41-42. (From *Marelli Review*, v. 24, 1950, p. 24-27.)

Explains the principle of the above.

6607* Calculation of the Most Economic Current Density. C. Manzitti. *Engineers' Digest*, v. 13, Feb. 1952, p. 55-56. (From *L'Elettrotecnica*, v. 38, Oct. 1051, p. 463-465.)

Discusses the question of whether the criteria employed for the determination of the economic density of current in electrical distribution networks are such as to ensure that maximum utilization of the power generated is obtained at minimum operating cost.

6608* Transient Phenomena in Electron Tubes. (In German.) H. Fack. *Frequenz*, v. 6, Feb. 1952, p. 33-37.

Presents results of a study of behavior of plane diodes towards sudden current changes and describes a simple equivalent circuit diagram which expresses approximately this transient phenomenon. Diagrams and graphs.

6609* Noise in Traveling-Wave Tubes. (In German.) W. Kleen. *Frequenz*, v. 6, Feb. 1952, p. 45-50.

Presents mathematical study of nature, causes, and possible ways of reducing above. Graphs are presented. 11 ref.

6610* The Life of Oxide Cathodes in Modern Receiving Valves. G. H. Metson, S. Wagener, M. F. Holmes, and M. R. Child. *Institution of Electrical Engineers, Proceedings*, v. 99, pt. 3, Mar. 1952, p. 69-81; disc., p. 82-87.

Integrates information on oxide cathodes which may have a bearing on life span. Original research results are included in addition to published work from other sources. 2 broad problems are distinguished as prerequisites to effective control of tube quality from the aspect of longevity. First, production processes must be more clearly understood in order that they may be closely related to tube life, and second, a short-term method for assessment of tube life must be developed. In considering a solution of the 1st problem, functional failure and cathode failure are recognized as the 2 main causes of tube faults. Only the latter is considered in detail, and this is subdivided into failures due to gas attack, to excessive interface feedback, and to excessive evaporation of the activated cathode.

6611 Single Response Thickness-Shear Mode Resonators Using Circular Bevelled Plates. R. Bechmann. *Journal of Scientific Instruments*, v. 29, Mar. 1952, p. 73-76.

It is important that piezoelectric crystals used in wave-filters be free from unwanted responses in a sufficiently wide frequency range. Discusses how this condition can be fulfilled by circular bevelled plates vibrating in high-frequency thickness modes. Also describes a special gap holder used for such plates and designed for use in oscillators with high-frequency stability. 15 ref.

6612 Space Charge and Transit Time Considerations in Planar Diodes for Relativistic Velocities. Henry F. Ivey. *Journal of Applied Physics*, v. 23, Feb. 1952, p. 208-211.

Extends Child-Langmuir equation to relativistic velocities for a diode with parallel plane electrodes. Solutions obtained are valid for any value of the accelerating voltage.

6613 Space-Charge-Wave Propagation in a Cylindrical Electron Beam of Finite Lateral Extension. Philip Parzen. *Journal of Applied Physics*, v. 23, Feb. 1952, p. 215-219.

A method is outlined for obtaining the effect of geometry on the above under arbitrary d.c. conditions. The complete space-charge diode is discussed in detail.

6614 Generalized Ideal Filters. Lotfi A. Zadeh and Kenneth S. Miller. *Journal of Applied Physics*, v. 23, Feb. 1952, p. 223-228.

Extends concept of ideal filter to both linear varying-parameter and nonlinear types of systems. Basic properties of ideal filters are investigated by the use of function space techniques. It is shown that linear ideal filters can separate 2 (or more) simultaneously transmitted sets of signals which occupy overlapping frequency bands, provided only the sets in question span disjoint manifolds in the signal space. 10 ref.

6615 The Effect of Gas Pressure in the Electric Bulb on the Polarity of the Rectified Current. Shang-Yi Ch'en and Wei-Cheng Li. *Journal of Applied Physics*, v. 23, Feb. 1952, p. 228-233.

When an electric bulb is connected to a source of alternating current, a rectified current is derivable from the surface of the bulb if the surface is hot and is coated externally by any conducting material. Presents further experimental study of the relationship between polarity of the rectified current and the pressure inside the bulb; relationship between magnitude of output and pressure inside the bulb; effect of nature of the gas in the bulb on the output; effect of nature of interior coating on polarity of the rectified current; and effect of external coating of the bulb with different substances.

6616 Space-Charge-Limited Currents Between Inclined Plane Electrodes. Henry F. Ivey. *Journal of Applied Physics*, v. 23, Feb. 1952, p. 240-249.

Applies the Walker method to the above problem. Solutions for potential distribution, space-charge characteristic ("perveance"), particle trajectories, and transit time are given. Results are presented in graphical and tabular form.

6617 The Electric Field in Diodes and the Transit Time of Electrons as Functions of Current. Paul L. Copeland and Delbert N. Eggenberger. *Journal of Applied Physics*, v. 23, Feb. 1952, p. 280-286.

Develops equations, applicable to all the most simple symmetries, as approximate solutions of the problems. Functions, applicable to electrons moving between coaxial cylinders, are tabulated to facilitate calculations of off-cathode field, off-anode field, transit time, and potential distribution for any fraction of the space-charge-limited current.

6618 Measurement of the DC Resistance of Selenium and Copper Oxide Rectifiers Below Room Temperature. D. M. Grimes and Sam Legvold. *Journal of Applied Physics*, v. 23, Mar. 1952, p. 312-315.

Values of the steady-state d.c. resistance of the above, as a function of temperature from 79 to 300°K, were obtained. Apparatus is diagrammed; data are charted and discussed.

6619 Correlation of DC and Microsecond Pulsed Emission From Oxide Coated Cathodes. Frank A. Horak. *Journal of Applied Physics*, v. 23, Mar. 1952, p. 346-349.

Describes a study of above emisson from oxide-coated cathodes prepared on 4 different base metals. One of the base metals was pure electrolytic Ni and the other 3 had impurities of 0.2% Si, and 4.7% W added to the Ni. The flat base-metal cathode was coated with equal molar Ba-Sr carbonate. The tubes were placed on life test at a cathode temperature of 1125°K. with no emission current drawn. D.c. and pulsed emission measurements were taken periodically. 3 methods were used to measure the zero-field emission current. Results show that the different cathode base metals control the variation in emission with life. 13 ref.

6620 Applying DC Synchros. R. A. Gerg. *Machine Design*, v. 24, Mar. 1952, p. 133-140.

Discusses inherent characteristics of the above and their various applications in industrial control. Circuit and schematic diagrams, and performance curves are given.

6621* Velocity-Modulation Valves for 100 to 1000 Watts Continuous Output. B. B. van Iperen. *Philips Technical Review*, v. 13, Feb. 1952, p. 210-222.

Explains how, with above tubes for 3 to 15 cm. wavelength, a continuous output of 100-1000 watts can be obtained. Includes graphs and diagrams.

6622* Some Aspects of Magnetic Amplifier Technique. F. E. Butcher and R. Willheim. *Proceedings of the I.R.E.*, v. 40, Mar. 1952, p. 261-270.

Principles are described which have led to the construction of precision amplifiers adaptable to a wide range of input impedances and output requirements. Performance figures are given and practical applications described. Graphical methods for dimensioning the circuit elements and for predicting the performance of the assembly are presented and applied to push-pull amplifiers. Performance limits imposed by zero stability and response time are reviewed and evaluated.

6623* The L-Cathode Structure. G. A. Espersen. *Proceedings of the I.R.E.*, v. 40, Mar. 1952, p. 284-289.

A new dispenser-type emitter, known as the L cathode, is described and compared with 3 common types of emitters. A discussion of methods of measuring the rate of barium evaporation is included, as well as of life performance of the L cathode in a number of diversified types of electron tubes.

6624* Cathode-Ray Tube for Recording High-Speed Transients. S. T. Smith, R. V. Talbot, and C. H. Smith, Jr. *Proceedings of the I.R.E.*, v. 40, Mar. 1952, p. 297-302.

A traveling-wave cathode-ray tube has been developed which will record single nonrecurrent transients of 0.5 $\mu\mu$sec. rise time. 13 ref.

6625* The Duplex Traveling-Wave Klystron. T. G. Mihran. *Proceedings of the I.R.E.*, v. 40, Mar. 1952, p. 308-315.

Tells how, by combining the properties of the klystron and the distributed amplifier, wide-band amplification of high-level microwave power can be obtained with an efficiency approaching that of an ordinary klystron. Construction and operation of an experimental model are described briefly.

6626* Electronically Controlled Resistors. James N. Thurston. *Proceedings of the I.R.E.*, v. 40, Mar. 1952, p. 315. (A condensation.)

Briefly outlines some of the work done on the above.

6627* A Note on a Selective RC Bridge. Peter G. Sulzer. *Proceedings of the I.R.E.*, v. 40, Mar. 1952, p. 338-339.

A simple resistance-capacitance bridge is described. The circuit is capable of providing higher selectivity than the Wien bridge, although it employs the same number of circuit elements.

6628* Waves on Inhomogeneous Cylindrical Structures. R. B. Adler. *Proceedings of the I.R.E.*, v. 40, Mar. 1952, p. 339-348.

An analysis is given of some of the basic properties of exponential modes on passive cylindrical structures in which the material constants of the medium vary over the cross section. The bounding surface is assumed to be opaque, in the form of an electric or a magnetic wall; it is therefore always nondissipative. Major consideration is given to structures in which the internal medium is also nondissipative. 10 ref.

6629* Radio Progress During 1951. *Proceedings of the I.R.E.*, v. 40, Apr. 1952, p. 388-439.

Comprehensive literature review under a series of main and subheadings. 779 ref.

6630* Transistor Forming Effects in *n*-Type Germanium. L. B. Valdes. *Proceedings of the I.R.E.*, v. 40, Apr. 1952, p. 445-448.

Some of the effects of electrical forming of the collector of an *n*-type Ge transistor are discussed. Evidence is presented for the existence of a region of *p*-type Ge underneath the formed electrode, together with some indication of the size of the formed region. 11 ref.

6631* Current Multiplication in the Type-A Transistor. W. R. Sittner. *Proceedings of the I.R.E.*, v. 40, Apr. 1952, p. 448-454.

Four possible mechanisms of the above process are discussed. 12 ref.

6632* The Cathamplifier. C. A. Parry. *Proceedings of the I.R.E.*, v. 40, Apr. 1952, p. 460-465. (Reprinted from *Proceedings of the Institution of Radio Engineers, Australia*, v. 2, Aug. 1950, p. 199-204.)

Discusses an amplifier circuit with high input impedance which permits push-pull operation from an unbalanced source. A voltage, proportional to the total circulating current of the push-pull system, is obtained from a transformer connected in the cathode circuits of the output valves. Over-all performance similar to usual push-pull operation may be obtained. The possibility of a single- or two-mode oscillator is also discussed. Because of the simplicity and general application of this circuit, some of the more useful formulas are developed in detail.

6633* Recent Developments in High-Power Klystron Amplifiers. V. Learned and C. Veronda. *Proceedings of the I.R.E.*, v. 40, Apr. 1952, p. 465-469.

Discusses the 3 types of electron-beam focusing used. Maximum power output, efficiency, gain, bandwidth, temperature compensation, and tuning means of present-day klystrons are briefly discussed. Examples of several typical tubes are given.

6634* An Internal Feedback Traveling-Wave-Tube Oscillator. E. M. T. Jones. *Proceedings of the I.R.E.*, v. 40, Apr. 1952, p. 478-482.

A theory of operation neglecting space charge is presented for the above. Experimental results, obtained from an oscillator using a helix as the interaction structure, are shown to agree closely with theory. A brief discussion of oscillators operating on space harmonics is given.

6635* On the Distribution of Energy in Noise — and Signal-Modulated Waves. II. Simultaneous Amplitude and Angle Modulation. David Middleton. *Quarterly of Applied Mathematics*, v. 10, Apr. 1952, p. 35-56.

6636* The Junction Transistor. H. S. Renne. *Radio & Television News*, v. 47, Apr. 1952, p. 38-39, 166.

Presents details on Bell Laboratories' newly-developed unit and a discussion of some potential uses.

6637* Crystal Electron Valves—Diode and Triode. Emerick Toth. *Research Reviews* (Office of Naval Research), Jan. 1952, p. 13-27.

Nonmathematical explanation of the above, giving theory of mode of action; types developed; and performance information. Diagrams.

6638 A Wide-Band Electrometer Amplifier. I. Pelchowitch and J. J. Zaalberg Van Zelst. *Review of Scientific Instruments*, v. 23, Feb. 1952, p. 73-75.

Shows possibility of designing the above with a stable and flat characteristic by applying feedback through an appropriate network. Circuit diagrams.

6639 Design of Subminiature Electrostatic Relays. Eugene W. Pike. *Tele-Tech*, v. 11, Apr. 1952, p. 36-37, 116-117.

Describes high-speed relay useful in aircraft, computer, and telemetering applications. It features low power consumption and direct operation from r.f. at any frequency.

6640 Germanium Diodes for Indicating Instruments and Relays. Fred J. Lingel. *Tele-Tech*, v. 11, Apr. 1952, p. 42-43, 100, 102, 104.

D.c. meters with germanium rectifiers have high sensitivity, wide frequency range and small size. "Chatter" and "arcing" can be minimized with d.c. relays; circuits require small actuating currents. Diagrams.

6641 Tetrodes Improve Harmonic Generation at VHF and UHF. Donald H. Preist. *Tele-Tech*, v. 11, Apr. 1952, p. 60-61, 118-120, 123.

Use of 4X150A and 4X150G tetrodes with positive feedback frequency multipliers permits high power gain per stage in transmitters operating in the 1000 mc. band. Diagrams.

6642* Miniature Transponder Beacon for Guided Missiles. B. H. Sinclair. *Tele-Vision Engineering*, v. 3, Feb. 1952, p. 8-9, 30; Mar. 1952, p. 14-17, 28.

Recently developed radar beacon, used with antenna flush-mounted in rocket skin, provides continuous flow of signals to tracking radar set on ground, regardless of the amount of tumbling in the air. Includes schematic and circuit diagrams.

33. *Electricity and Electronics*

6643* Printed Circuit Design and Assembly Techniques. Part II. *Tele-Vision Engineering*, v. 3, Mar. 1952, p. 19, 29-30.

Covers components; electrical characteristics of assemblies; cost estimates; recent developments; and future of the printed circuit.

6644* Slideback and Infinite-Impedance Voltmeters; Response to Signal and Noise. R. E. Burgess. *Wireless Engineer*, v. 29, Mar. 1952, p. 59-62.

Two types of tube voltmeter are considered which have been used for noise measurement and have certain interesting features. Curves are given for rectification characteristics of the 3 types of voltmeter (simple diode, slideback, and infinite-impedance) for c.w. signals and for fluctuation noise applied separately; formulas give the response to any arbitrary mixture of signal and noise.

6645* Cathode-Coupled Amplifier; Analysis and Design. J. A. Lyddiard. *Wireless Engineer*, v. 29, Mar. 1952, p. 63-67.

The usual equivalent network representing the cathode-coupled amplifier stage leads directly, using Kirchhoff's Laws, to a cumbersome formula which does not give a clear picture of the performance, or assist in simple and rapid design procedure. The analysis presented treats this amplifier stage as a cathode-follower driving an earthed-grid voltage amplifier, which results in a very simple analysis and clearly indicates a sound procedure for design work.

6646* Elementary Theory of Electron-Ray Generation With Triode Systems. II. Current Strength and Structure of the Electron Bundle. (In German.) M. Ploke. *Zeitschrift für angewandte Physik*, v. 4, Jan. 1952, p. 1-12.

Discusses investigation of the properties of the electron bundle with the aid of electron optics. Langmuir's space-charge formula is used to derive an approximation formula for current strength and density in different ray cross sections and for the effect of space charge on the field picture. Results indicate various conclusions respecting proper dimensions of triode systems. Includes graphs and diagrams. 11 ref.

Miscellaneous Publications

6647 Effect of Copper in the Permanganimetric Analysis of Humic Extracts. Determination of Copper Index. (In French.) G. Martin and J. Lavollay. *Fourth International Congress of Soil Science, Transactions*, v. 3, 1950, p. 83-88. (S590 I8t4)

Discusses the technique generally used for determining humic materials which consists in a permanganic oxidation of alkaline extracts. The influence of manure was investigated. A copper index for the humic extracts of specimens from soils removed from various depths was determined. Includes tabular data.

6648 High-Frequency Voltage Measurements. Myron C. Selby. National Bureau of Standards, Circular 481, Sept. 1, 1949, 14 pages. (T21 Un3c)

Presents an up-to-date account of fundamental principles and techniques used for voltage measurements primarily for frequencies in the upper audio and r.f. ranges and including part of the uhf. range. Intended to give professional workers and graduate students a more comprehensive picture of the methods employed than presently available in textbooks and handbooks. 62 ref.

6649 The Heterodyne Filter. Gunnar Fant. *Transactions of the Royal Institute of Technology*, no. 55, 1952, 77 pages. (T4 R81t)

The hetrodyne wave analyzer is a useful laboratory instrument for the measurement of frequency spectra. Shows how the wave-analyzer principle can be expanded to give a filter of not only continuously variable mid-frequency, but also of a continuously variable bandwidth. An inverse wave analyzer performance can also be obtained, i.e., a band elimination filter of fixed band width and continuously variable mid-frequency.

6650 Voltage Stability of Synchronous Alternators With Capacitive Loads. Erkki Voipio. *Transactions of the Royal Institute of Technology*, no. 56, 1952, 64 pages. (T4 R81t)

Presents results of a theoretical, mathematical analysis of above problem, correlated with experimental data from the literature. 24 ref.

Books

6651 Television Engineering. Donald G. Fink. 721 pages. 1952. McGraw-Hill, New York. (TK6630 F49t2)

Technical treatment of the above. Aspects peculiar to television technology, such as scanning and waveform analysis, illumination and colorimetry, camera tubes, and picture tubes are treated in detail, starting from first principles. Includes design, operation, and use of equipment.

6652 D-C Power Systems for Aircraft. R. H. Kaufmann and H. J. Finison. 206 pages. 1952. John Wiley & Sons, New York. (TL690 K16d)

Aircraft power systems are studied from the viewpoint of the coordination of individual electrical devices to make up the complex power system. Practices generally used by engineers in the field are analyzed on the basis of performance data obtained in actual flight tests. Based on both theoretical analysis and comprehensive flight and laboratory tests made by the authors and their associates at General Electric and at the Air Force Laboratories at Wright Field. Numerous diagrams, graphs, and illustrations. Chapter bibliographies.

6653 Electromagnetic Problems of Microwave Theory. H. Motz. 184 pages. 1951. Methuen & Co., London. (QC661 M85e)

Presents thoroughly worked examples to illustrate the analysis of the above. The electromagnetic-field concept is emphasized throughout the book. Chapter references.

6654 Les Hyperfréquences; Circuits et Propagation des Ondes en Vue des Applications au Radar et aux Télécommunications. (In French.) (The Ultra High Frequencies; Circuits and Propagation of Waves, With Regard to Their Application to Radar and Telecommunication.) R. Rigal. 224 pages. 1950. Editions Eyrolles, Paris. (TK6575 R44h)

Discusses transmission devices, resonators, radiating devices, and propagation conditions for above range of wave propagation. Includes numerous diagrams.

See also:
5684 (electronic atomic-energy instruments)
5758 (electronic differential analyzers)
5887 (vacuum heating in electron-tube construction)

34. GRAPHIC ARTS

6655* Nature and Cause of Greasing in Lithographic Printing. *Canadian Printer and Publisher*, v. 61, Mar. 1952, p. 49.

While ink is usually blamed, many other factors may cause trouble for the offset pressman. Describes what researchers have discovered.

6656 Printing Inks. C. C. Mill. *Chemistry & Industry*, Feb. 23, 1952, p. 156-159.

Discusses application, rheology, interpretation of rheological data, properties, and performance of ink on rollers. 12 ref.

6657* The Grainless Plate Today. Norman A. Mack. *Graphic Arts Monthly and the Printing Industry*, v. 24, Mar. 1952, p. 68-70.

Briefly discusses applications of the above in lithography.

6658* Colorimetric Investigations in Multicolor Printing. J. A. Yule and R. Colt. *Modern Lithography*, v. 20, Mar. 1952, p. 43-44.

Discusses color-correction in relation to modification of the masking and Neugebauer equations.

6659 Color Control. *Modern Packaging*, v. 25, Mar. 1952, p. 189-193.

Discusses the essentials of color-control methods used today in printing packages.

6660 Lithographing on Coated Paper. Part I. Robert F. Reed. *National Lithographer*, v. 59, Mar. 1952, p. 26-29.

Describes ways in which coated offset papers are different from uncoated. Discusses advantages and disadvantages. (To be continued.)

6661 The Preparing of Albumen Plates. Frank E. England. *National Lithographer*, v. 59, Mar. 1952, p. 30-31.

Describes processes of cleaning, inking, and checking plates.

6662 Spectral Sensitivity of Photosensitive Acid Resists. Brian O'Brien, Jr. *Journal of the Optical Society of America*, v. 42, Feb. 1952, p. 101-103.

Several resins, both synthetic and natural, used as acid resists in photoengraving, are rendered photosensitive by the addition of alkali dichromates. The mechanism of this photosensitization was studied. Al plates, coated with the resins, were exposed in a medium quartz spectrograph using a controlled white-flame arc and a rotating logarithmic spiral sector to produce wedge spectra.

6663 Light Scattering in Halftone Prints. Francis P. Callahan, Jr. *Journal of the Optical Society of America*, v. 42, Feb. 1952, p. 104-105.

By treating the print as a filter in contact with a scattering medium and ignoring 2nd-order effects, approximate equations are derived which enable an upper limit to be set on error resulting from use of the Neugebauer equations in the usual way.

6664 Fourier Treatment of Optical Processes. Peter Elias, David S. Grey, and David Z. Robinson. *Journal of the Optical Society of America*, v. 42, Feb. 1952, p. 127-134.

Many optical processes of image formation, image transfer, and image analysis may be represented as one, or a succession of several, linear operations. This method of analysis is an extension of the usual method of treating filters in electronic circuits, and may be used to solve problems analogous to those treated in circuit theory. These are: evaluation of the performance of a system; design of a process to search an image for a configuration; reproduction of pictures, with discrimination in favor of a configuration desired, and against others; and equalization of picture, i.e., removal of image degradation.

6665* The Dependence of Photographic Sensitivity on Temperature. G. C. Farnell. *Philosophical Magazine*, ser. 7, v. 43, Mar. 1952, p. 289-305.

Surveys factors affecting above. Shows that the speed loss on passing from room to liquid-N_2 temperature is due to decreased adsorption of halide and the very high intensity at exposure. Graphical and tabular data. 18 ref.

6666* A Contribution to the Theory of Development. M. Abribat. *Photographic Journal*, v. 92B, Jan.-Feb. 1952, p. 25-35.

A study of the mechanism of photographic development. The properties of several photographic developers, including some of the more unusual types, are explained.

6667* Temperature Dependence of the Viscosity of Photographic Emulsions and Gelatin Solutions. (In Russian.) M. I. Shor. *Zhurnal Prikladnoi Khimii*, v. 24, July 1951, p. 748-753.

Data are tabulated and discussed.

Books

6668 Fundamental Mechanisms of Photographic Sensitivity. 347 pages. 1951. Butterworths Scientific Publications, London. (TR5 C76f)

Presents several papers by different authors covering the following topics: physical properties of silver halides; production and properties of silver-halide grains in photographic emulsions; latent-image formation; and nuclear-track emulsions.

See also:
5312 (wear of electrodeposits on printing plates)
5737 (deterioration of lithographed or printed packages)
5787a (high-speed photography)

35. STATISTICS AND ECONOMICS

6669 Lone Star Steel Hitches Its Wagon to the Oil Industry. *Business Week*, Mar. 29, 1952, p. 64-66, 69.

Describes organization, financing, and layout of above Texas company, most of whose steel is earmarked for the state's booming oil industry.

6670 Industrial Mexico: The Goal Is Nearer. *Business Week*, Apr. 5, 1952, p. 133-134, 136-138.

Describes present status of Mexican industrialization program, briefly treating finance, power, oil, coal and iron, mining, and manufacturing.

6671 What's Ahead for Steel? Kenneth S. Harris. *Canadian Metals*, v. 15, Apr. 1, 1952, p. 8-9.

A brief survey of the status of steel production and supply in Canada. Predicts 1,000,000-ton capacity increase by 1953.

6672 Scoreboard for Metals. H. McLeod. *Canadian Metals*, v. 15, Apr. 1, 1952, p. 10-12.

Gives latest official statistics on Canada's metalworking industries, for iron and steel production, nonferrous metals, and manufactured products.

6673 Metalworking Facts and Figures. *Canadian Metals*, v. 15, Apr. 1, 1952, p. 14-20.

This Journal's annual issue of tabular information on every branch of the Canadian metalworking industries, compiled by Dominion Bureau of Statistics.

6674* Canada's Petroleum Industry. Oliver B. Hopkins. *Canadian Mining and Metallurgical Bulletin*, v. 45, Mar. 1952, p. 138-147; *Transactions of the Canadian Institute of Mining and Metallurgy*, v. 55, 1952, p. 108-117.

General descriptive survey of above covering technological and economic aspects of production, refining, and uses of petroleum. Charts and maps.

6675* The Presence of Uranium in North African Phosphates. (In French.) Antoine A. Guntz. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Feb. 18, 1952, p. 868-870.

Describes the composition of specimens taken from different parts of North African phosphate beds which indicate the presence of uranium.

6676* What Forces Affect Availability and Substitution of Materials? Franklin P. Huddle. *Electrical Manufacturing*, v. 49, Apr. 1952, p. 128-131, 312, 314, 316, 318, 320, 322, 324.

A discussion of the above especially useful for the product-design engineer. Considers such factors as international tensions, military planning, strategic geographic availability, and economic trends here and abroad. Includes a table of relative availability of selected basic materials.

6677 How to Stimulate Production of Base Metals in the Americas. Charles Will Wright and Lester G. Morrell. *Engineering and Mining Journal*, v. 153, Mar. 1952, p. 80-83.

Discusses the above. Surveys world production and consumption of Cu, Pb, and Zn. Describes the supply situation in the U.S. and the Americas. Data are graphed.

6678* Current Trends in Foreign Trade Policies: Review of 1951. Part I. General Survey. Henry Chalmers. *Foreign Commerce Weekly*, v. 46, Mar. 31, 1952, p. 3-6.

6679* Pulpwood: A European Raw-Material Problem. Walker J. Myers. *Foreign Commerce Weekly*, v. 47, Apr. 7, 1952, p. 3-4, 24-27.

An economic survey of the above—a shortage problem—with separate treatment of the more important European countries. Production and import-export statistics.

6680 Statistical Methods in the Chemical Industry Part 4. (Concluded.) O. L. Davies. *Industrial Chemist and Chemical Manufacturer*, v. 28, Mar. 1952, p. 103-106.

Considers the practical application of statistical methods in production.

6681* World Petroleum Developments. C. A. P. Southwell. *Institute of Petroleum Review*, v. 6, Feb. 1952, p. 33-39.

Deals briefly with the general trends. Describes Canada, the natural-gas industry in the U.S., the Trans-Arabian pipeline, and Kuwait in detail.

6682* Venezuela: Point of More Return. Lloyd G. Smith. *International Markets*, Feb. 1952, p. 8-12, 14, 16, 18-21.

Discusses expansion and development in Venezuela. Shows how the Venezuelan market developed through 1951.

35. *Statistics and Economics*

6683 New Production Facilities; A Brief Survey of the Machine-Tool Industry Today. Ralph J. Kraut. *Mechanical Engineering*, v. 74, Mar. 1952, p. 212-214, 218.

Discusses briefly 3 aspects of the machine-tool industry: background and functions of the machine-tool industry in peace and war, status of America's machine-tool equipment, and the machine tool of yesterday, today, and tomorrow.

6684* Nonferrous Metals in the Year 1951. (In German.) Heinrich Sennekamp. *Metall*, v. 6, Jan. 1952, p. 31-37.

Presents statistical data on production and consumption, etc., of the above in Germany in 1951.

6685* The Earth's Known Uranium Ore Deposits. (In German.) E. Kohl. *Metall*, v. 6, Feb. 1952, p. 92-97.

Some tabulated data supplement discussion of above by countries and continents.

6686* Development of the Light-Metal-Ware Industry in 1951. F. S. Behrens. (In German.) *Metall*, v. 6, Mar. 1952, p. 145-146.

Surveys the above, giving some statistics, mainly for Germany. Includes Al foil, metal powders, sprayed parts, tubing, etc.

6687* The Aluminum Industry of Yugoslavia. (In German.) *Metall*, v. 6, Mar. 1952, p. 154.

Briefly reviews the latest developments on the basis of the literature, such as the building of new plants and the enlargement of existing ones. Projected production is indicated.

6688 Increased Demand for Refined Products Seen for 1952. Cecil W. Smith. *Petroleum Refiner*, v. 31, Mar. 1952, p. 114-117.

Extensive tables and graphs.

6689 Carribbean Bauxite. (In French.) G. A. Baudart. *Revue de l'Aluminium*, v. 29, Jan. 1952, p. 1-3.

Known since 1869, and rediscovered in 1942, Jamaican bauxite bodies are moving into the picture as the main source of supply for the North American aluminum producers. Three companies, one Canadian and two American, are setting up mining and ore-treatment plants. The geographical position of the island, compared with that of the Guianas, will lead to a more than 50% cut on the present sea journey of the ore to the American plants on the Gulf.

6690* Iron Ore in 1951. *Skillings' Mining Review*, v. 40, Mar. 15, 1952, p. 1-2.

Statistical summary of iron-ore production and shipments from the U.S. for 1951.

6691* 1951 L.S. Iron Ore Shipments by Mines. *Skillings' Mining Review*, v. 40, Mar. 22, 1952, p. 1-2.

Brief discussion and report of Lake Superior region iron ore shipments.

6692* Rebirth of an Industry. Margot Shore. *Steelways*, v. 8, Mar. 1952, p. 28-29.

Discusses industrial potentialities of France with respect to iron-ore reserves and steel production.

6693* London & Cambridge Economic Service. *Times Review of Industry*, new ser., v. 6, Mar. 1952, 16-page supplement between p. 52 and 53.

A new feature of this periodical; to appear quarterly. Present issue contains 10 articles by various authors on different topics of industrial economics in Britain, as well as United Kingdom statistical tables.

6694 Plans for Steel Mill in Peru; Project Extending Industrialization in Latin America to Go Ahead. *Times Review of Industry*, new ser., v. 6, Mar. 1952, p. 85.

Describes plans for development of the Marcona iron ore deposits near Lima.

6695* Kuibyshev and Stalingrad Hydroelectric Stations—A New Step in the Development of Electrification of the USSR. V. I. Veits. *Vestnik Akademii Nauk SSSR*, v. 21, May 1951, p. 51-61.

The development of electrification in Russia is described with particular emphasis on construction of the two new systems named above.

6696* The Zinc Situation. Wallace G. Woolf. *Western Miner*, v. 25, Mar. 1952, p. 35-37.

Reviews the above with respect to properties and uses of Zn, industrial development, and government control.

6697* Mining and Smelting Industry of Finland. (In German.) Eero Mäkinen. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 4, Dec. 1951, p. 445-446.

Presents short outline of the above. Describes principal types of ore found in Finland and the companies mining and processing them.

Miscellaneous Publications

6698 Market Outlook for Sulfur Recoverable From Coal. Part I. The Sulfur Market Problem. Part II. Sources of Sulfur. Walter H. Voskuil. *Proceedings of the Illinois Mining Institute*, v. 59, 1951, p. 80-100. (TN1 I6p)

Data are tabulated and discussed.

6699 Illinois Mineral Industry in 1950. Walter H. Voskuil. Illinois State Geological Survey, Report of Investigations 158, 58 pages. (TN21 I6r)

Books

6700 Energy Sources—The Wealth of the World. Ed. 1. Eugene Ayres and Charles A. Scarlott. 344 pages. 1952. McGraw-Hill, New York. (TJ153 Ay74e)

Presents thorough census of our energy sources, past, present, and future. The history of man's efforts to wrest energy from nature is given, then a detailed review of the size of energy resources, technology of production, efficiency of conversion, and progress being made in conservation. Tells much about all types of energy sources and what we may expect of them in the future. Oil, coal, hydroelectricity, solar and nuclear energy, even wind and tide power are covered. Survey includes classified bibliography.

6701 Company Annual Reports to Stockholders, Employees, and the Public. Thomas H. Sanders. 338 pages. 1949. Division of Research, Graduate School of Business Administration, Harvard University, Boston. (HG4028.B2 Sa56c)

Part I contains a condensed statement of the aims and problems of the annual report and the author's views concerning them. Part II assembles and summarizes the views and efforts of different groups interested in the annual report. Part III presents a statistical summary of accounting trends in annual reports over a period of 15 yrs.

6702 Mineral Forecast 2000 A.D. Edward Steidle. 152 pages. 1952. School of Mineral Industries, Pennsylvania State College, State College, Pa. (Circular 39) (TN21 P38c.)

Reviews our dependence on outside sources for various strategic and critical mineral supplies, together with the necessity for down-to-earth mineral policies. Shows how education and research can constantly point out new directions of effort and prove that what we lack in quality resources can be offset by better brains and skills. Establishes a long-range goal toward which the activities of Pennsylvania's School of Mineral Industries can be directed.

6703 Hearings Before the Subcommittee on Study of Monopoly Power of the Committee on the Judiciary, House of Representatives, Eighty-Second Congress, First Session. Serial No. 1. Part 1. Aluminum. Part 4. The Mobilization Program. 916 and 1060 pages. 1951. U.S. Government Printing Office, Washington. (HO2769 Un3s)

6704 Hearings Before the Subcommittee on Rubber of the Select Committee on Small Business, United States Senate, Eighty-Second Congress, First Session on Allocation of Rubber. Part 1. 577 pages. 1951. U.S. Government Printing Office, Washington. (HD9161 Un3r)

Includes statements of a large number of individuals connected with the rubber industry, and otherwise concerned, in connection with governmental regulations affecting the industry.

See also:
5064 (economics of tungsten production)
5089 (electric-furnace steelmaking as coal consumer)
6082 (cost analysis of S recovery from H_2S)
6440 (world nitrogen supply)
6458 (Economics of American Agriculture—book)
6589 (electronic analogue for economic system)

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6705 How to Work With Beryllium-Copper Strip. John T. Richards. *American Machinist*, v. 96, Mar. 31, 1952, p. 99-114.

Includes information on press working, heat treating, soldering, brazing, welding, cleaning, and electroplating. Also gives the engineering properties of Be-Cu strip, and factors to be considered in designing parts to be produced from it. Graphs, tables, and illustrations.

6706 More Unsolved Problems; Additional Research Projects From ASTM Committees. *American Society for Testing Materials Bulletin*, Feb. 1952, p. 19-20.

States unsolved problems, giving in each case the present state of knowledge, questions to be answered, and introductory references. Problems are: Particle Size of Hydrated Limes; Can Mortar Properties Be Improved by More Thorough Mixing?; Non-Destructive Tests for Wood; Temperature and Humidity Measurements on Asphaltic Roofing Materials; and Study of Crack Genesis and Growth in Steel.

6707* The State of Russian Science Today. I. Lysenko's "Michurinist" Genetics. Theodosius Dobzhansky. **II. Soviet Mathematics.** J. R. Kline. *Bulletin of the Atomic Scientists*, v. 8, Feb. 1952, p. 40-47.

Analyzes Lysenko's theories and discusses their 19th century origins and the motives of their present-day advocates. In contrast, an outline is given of the advancements in the field of mathematics. Russian mathematicians are said to have made leading contributions.

6708* The Relaxation Method in Stress Analysis. D. G. Christopherson. *British Journal of Applied Physics*, v. 3, Mar. 1952, p. 65-72.

Discusses various proposals which have been made to accelerate the convergence of the relaxation method as applied to the solution of some of the well-known differential equations of physics and engineering. 10 ref.

6709 Research Mission to Europe. Harold Vagtborg. *Chemical and Engineering News*, v. 30, Mar. 31, 1952, p. 1278-1281, 1338.

Describes tour made by a group of research administrators from U.S. research institutes to determine the means by which industrial research in each country visited may be encouraged, strengthened, and coordinated.

6710* Discovery of Uranium in the Phosphate Deposits of Morocco. (In French.) André Lenoble, Henri Salvan, and Valéry Ziegler. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Feb. 25, 1952, p. 976-977.

A series of measurements of the density of β and γ radiations in the phosphate deposits of Morocco was made. Results are briefly outlined.

6711 Science Is Not Enough. J. K. Finch. *Journal of the Franklin Institute*, v. 253, Mar. 1952, p. 201-210.

The author, who is Dean Emeritus and Renwick Professor of Civil Engineering at Columbia University, takes issue with the viewpoint that pure science is sufficient for technical progress, and that engineering and applied science are to be despised or deprecated. In support of his arguments he points out that, from Faraday to Maxwell and Kelvin and from Darwin to Huxley and Tyndall, Britain has produced some of the greatest leaders in modern science. Yet in the last 50 years, which have marked such an extraordinary era of material progress in the U.S., Britain has been steadily declining in her industrial and economic position.

6712 The Independent Research Institutes — Their Future. Frank C. Croxton. *Isotopics*, v. 28, Mar. 1952, p. 10.

6713* Route of the Main Turkmen Canal. (In Russian.) V. A. Kovda and P. A. Letunov. *Izvestia Akademii Nauk SSSR*, Geographical Series, no. 3, 1951, p. 3-14.

The location of this canal, which was approved in 1950, is outlined. The amount of land brought under irrigation and its influence on the Soviet economy are discussed.

6714* Theory of Neutron Mineral Exploration. (In Russian.) Iu. P. Bulashevich. *Izvestiia Akademii Nauk SSSR*, Geophysical Series, May-June 1951, p. 32-36.

A method of locating rock formations characteristic of petroleum deposits by the use of thermal neutrons is described. Various problems connected with the method are discussed.

6715 Operations Research, What Is It? Philip M. Morse. *Journal of Applied Physics*, v. 23, Feb. 1952, p. 165-172.

A general discussion of the above. Reviews attempts at definition. Discusses development of the procedure, and administrative, military, commercial, scientific, and transportation applications.

6716 Operations Research. Earl S. Lamm. *Machine Design*, v. 24, Mar. 1952, p. 102-107.

Discusses the above, which is a term chosen to designate the adoption of scientific methods for investigating problems outside conventional fields of science. Military, business, and industrial problems are cited as examples.

6717 Gold Scrap Recovery Methods Applicable to Scarce and Costly Materials. Bernard Blackman and Carl Heinzman. *Materials & Methods*, v. 35, Mar. 1952, p. 102-104.

Describes and illustrates program of Keystone Watch Case Div., Riverside Metal Co. Applicability to other types of metalworking industries is indicated.

6718* Titanium; Occurrence, Extraction, Workability, and Properties of the Metal and Its Alloys. A. D. Merriman. *Metal Treatment and Drop Forging*, v. 19, Mar. 1952, p. 99-106.

6719* New FluoSolids Experience. G. G. Copeland. *Mining Congress Journal*, v. 38, Mar. 1952, p. 42-44, 54.

Discusses recent developments in the fluidized-bed process with special application to sulfide roasting for production of SO_2.

6720* Titanium: How Will You Use This New Metal? *Modern Industry*, v. 23, Mar. 15, 1952, p. 44-50.

Semi-popular treatment of results of first 3 years of commercial development. Surveys many aspects—production, properties, potential uses, and economics.

6721 Titanium; Its Processing and Subsequent Mechanical Properties. *SAE Journal*, v. 60, Mar. 1952, p. 21-25. (Excerpts from "Design and Manufacturing Techniques With Titanium," by O. A. Wheelon.) (To be published in full in *SAE Quarterly Transactions.)*

Discusses the above, and also includes physical properties, welding, machining, corrosion resistance, production difficulties, and comparative data for Ti, Al, steel, and Monel.

6722 Trends in Aircraft Development and Research. *SAE Journal*, v. 60, Mar. 1952, p. 42-44.

Includes excerpts from papers by Hugh L. Dryden, NACA, C. M. Bolster, USN, and D. L. Putt, USAF. Discusses the various phases of research being concentrated upon.

6723 The Support of Research in Medical and Allied Fields for the Period 1946 Through 1951. Stella Leche Deignan and Esther Miller. *Science*, v. 115, Mar. 28, 1952, p. 321-343.

This report, comprising an analysis of 12,923 research grants registered with the Medical Sciences Information Exchange during the period 1946-51, is based on research grants and contracts awarded by government and by the larger public and private foundations. Includes extensive tabular and graphical data.

6724* Stainless Clad Steels. Helmut Thielsch. *Welding Journal*, v. 31, Mar. 1952, p. 142s-160s.

Review of published and unpublished information on manufacturing methods, carbon diffusion, physical and mechanical

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properties, heat treatments, welding procedures and processes, dilution, selection of welding electrodes, and flame cutting. Photomicrographs, diagrams, and tabular data. 81 ref.

Miscellaneous Publications

6725 Operating Characteristics of the Carver 176-Saw Linter. Dick H. Piner, Jr., and A. Cecil Wamble. Texas Engineering Experiment Station, Research Report 31, Nov. 1951, 9 pages. (T21 T31)

The removal of linters from cottonseed prior to oil extraction has long been a phase of production in the oil mill. Although the 176-saw linter has given satisfactory service industrially, experiments were conducted with it as part of a comprehensive investigation by the Texas Engineering Experiment Station and Cotton Research Committee of Texas of all oil-mill operations. Delinting data show that roll density and saw projection are important factors in increasing the machine's capacity.

6726 Summary of the Research Work of the Trace Elements Section, Geochemistry and Petrology Branch, for the Period Jan. 1-Mar. 31, 1951. John C. Rabbitt. U. S. Atomic Energy Commission, TEI-151, May 1951, 37 pages. (UF767 Un3t)

A report prepared for the U. S. Geological Survey.

Books

6727 Tables of the Error Function and of Its First Twenty Derivatives. Howard H. Aiken, director. 276 pages. 1952. Harvard University Press, Cambridge, Mass. (QA275 H26t)

6728 Theoretical Petrology; A Textbook on the Origin and the Evolution of Rocks. Tom F. W. Barth. 387 pages. 1952. John Wiley & Sons, New York. (QE431 B28t)

Presents a comprehensive study of rock-formation processes and an interpretation and synthesis of existing data. Covers igneous, sedimentary, and metamorphic rocks.

6729 Mathematics, Queen and Servant of Science. Eric Temple Bell. 437 pages. 1951. McGraw-Hill, New York. (QA21 B41m)

The story of the developments in pure and applied mathematics from the geometry of Euclid 2200 years ago, to the most recent developments in mathematical physics. Clearly and informally written, this book presents the ideas of mathematics apart from the formulas, since it is the spirit rather than the structure of mathematics with which it is primarily concerned.

6730 Developing Men for Controllership. T. F. Bradshaw. 231 pages. 1950. Division of Research, Graduate School of Business Administration, Harvard University, Boston. (HF5550 B72d)

Concerned with the problem of what companies can do to develop men for the management function of controllership. In this report, based on extensive field observations, the author points out the opportunities, explains the requirements of the job, sets forth the problems in training and developing men for executive positions as controllers, and analyzes steps being taken by various companies to help solve these problems.

6731 Petroleum Conservation. Stuart E. Buckley, editor. 304 pages. 1951. American Institute of Mining and Metallurgical Engineers, New York. (TN870 B85p)

Represents a departure from the usual practice of preparation either by a single author or by various authors whose writings appear as separate chapters individually prepared. Instead, individual contributions on many subjects are combined to form a coordinated presentation.

6732 Effects of Taxation on Corporate Mergers. J. Keith Butters, John Lintner, William L. Cary, and Powell Niland. 364 pages. 1951. Division of Research, Graduate School of Business Administration, Harvard University, Boston. (HD2753.A3 B98e)

The influence of taxation on mergers, as on any form of business action, can be appraised accurately only when it is viewed as one of many relevant forces. This book, accordingly, has developed into a general study of corporate mergers; as such it will be of interest to many who are not concerned with tax problems.

6733 The Sea Around Us. Rachel L. Carson. 230 pages. 1951. Oxford University Press, New York. (GC11 C23s)

Presents an informative story of the ocean. Covers such topics as how life began in the primeval sea; the hidden lands; life recently discovered; currents and tides; and mineral resources.

6734 Four Thousand Million Mouths; Scientific Humanism and the Shadow of World Hunger. F. Le Gros Clark and N. W. Pirie, editors. 222 pages. 1951. Oxford University Press, London. (HD9000.5 C54.1f)

The 11 chapters are written by different authors. The book begins with a historic survey of the problem implicit in man's fecundity; it closes with a brief historical note on his ingenuity in preparing and conserving the possible sources of food.

6735 Interplanetary Flight; An Introduction to Astronautics. Arthur C. Clarke. 164 pages. Harper & Bros., New York. (TL790 C55i)

Surveys the possibilities and problems of interplanetary flight, as far as they can be foreseen at the present day. Approach throughout is from the astronomical rather than the engineering point of view.

6736 Notes on the Prehistoric Metallurgy of Copper and Bronze in the Old World. H. H. Coghlan. 131 pages. 1951. Oxford University Press, London. (TN616 C65n)

Contains the following chapters: Native Copper and the Ores From Which Prehistoric Non-Ferrous Metals Were Obtained; The Discovery of the Non-Ferrous Metals in Antiquity; The Sequence of the Metals—Analyses and Metallography as Means of Distinguishing the Various Metals; The Mechanical Properties of Copper and Bronze; The Casting Process: Furnaces, Bellows, and Crucibles; Methods of Working the Metals; Results of Metallurgical Examination; Examination of Specimens From the Pitt Rivers Museum; Bronze Castings in Ancient Mounds; Analyses of Native Copper and Artefacts; and a Note on Specimens in the Pitt Rivers Museum Illustrating *Cire Perdue* Casting. Includes 4-page bibliography, diagrams, photographs, and micrographs.

6737 The Executive at Work. Melvin T. Copeland. 278 pages. 1951. Harvard University Press, Cambridge, Mass. (HD31 C79e)

Discusses the fundamentals of administration and organization, outlines the qualities needed for the attainment of executive leadership, and places in its proper perspective the social importance of effective leadership.

6738 The Board of Directors and Business Management. Melvin T. Copeland and Andrew R. Towl. 202 pages. 1947. Division of Research, Graduate School of Business Administration, Harvard University, Boston. (HD2745 C79b)

Focuses attention on the responsibilities of directors, both as individuals and as a group, in the administration of American business corporations. It also discusses a variety of specific problems of administering companies in different stages of development.

6739 Production of Motor Vehicles. Henry M. Cunningham and William F. Sherman. 169 pages. 1951. McGraw-Hill, New York. (TL240 C91p)

Outlines the over-all management "know-how" needed to plan and bring into production a new-model automobile or truck. Illustrates and describes the various types of paperwork necessary.

6740 The Influence of Hormones on Enzymes. R. I. Dorfman and E. D. Goldsmith, chairmen. *Annals of the New York Academy of Sciences*, v. 54, art. 4, Dec. 28, 1951, p. 531-728. (Q11 N49a)

Consists of introduction plus 15 papers presented at conference of the Section of Biology of the New York Academy of Sciences, June 5-6, 1951.

6741 Mathematics for Engineers. Raymond W. Dull. 822 pages. 1951. McGraw-Hill, New York. (QA37 D88m3)

Covers every phase of mathematics the engineer is likely to

meet, from algebraic notations, determinants, and linear equations—through differential calculus, curve analysis, integration, summation, etc.

6741a Geology; Principles and Processes. William H. Emmons, George A. Thiel, Clinton R. Stauffer, and Ira S. Allison. 502 pages. 1949. McGraw-Hill, New York. (QE26 Em67g3)

Presents the above as a beginning course for college students. Contains numerous aerial photographs. Includes a chapter on the nature of matter and of atomic structure. Chapter references.

6742 Silicate Analysis. Ed. 2. A. W. Groves. 336 pages. 1951. George Allen & Unwin, Ltd., London. (QE389.62 G91s2)

Presents a manual for geologists and chemists with chapters on check calculations and geochemical data.

6743 The Technique of Clear Writing. Robert Gunning. 289 pages. 1952. McGraw-Hill, New York. (PE1408 G95t)

In 1944 Robert Gunning Associates set up a business not listed among more than 20,000 job classes of the U. S. census. This new work was readability counseling. The author is well-known to many of the Battelle staff by reason of his counseling work with them. He presents and discusses "Ten Principles of Clear Writing," as the major portion of the book. The opening chapters tell what has been learned about the habits and preferences of readers. The closing chapters review causes and cures for foggy writing in business, journalism, law, and technical fields.

6744 Vitamins and Hormones; Advances in Research and Applications. Vol. IX. Robert S. Harris and Kenneth V. Thimann, editors. 395 pages. 1951. Academic Press, New York. (QP801.V5 V83)

Consists of the following reviews: "The Role of Vitamin B_{12} in Metabolic Processes," Thomas H. Jukes and E. L. Robert Stokstad; "Functions of Biotin in Enzyme Systems," Herman C. Lichstein; "The Function of B-Vitamins in the Biosynthesis of Purines and Pyrimidines," William Shive; "Antimetabolites of Nucleic Acid Metabolism," Lemuel D. Wright; "The Effect of Vitamin Deficiencies on Adrenocortical Function," Agnes Fay Morgan; "Relationship Between Estrogens and Enzyme Activity," William H. Fishman; "The Synthesis and Metabolism of Radioactively-Labeled Steroids," Gray H. Twombly; "Effects of Cortisone and ACTH," Randall G. Sprague; and "Urinary Gastric Secretory Depressants (Urogastrone)," M. H. F. Friedman.

6745 Selection, Training, and Use of Personnel in Industrial Research. David B. Hertz and Albert H. Rubinstein, editors. 274 pages. 1952. King's Crown Press, New York. (HF5549 H44s)

Proceedings of 2nd annual conference on industrial research sponsored by Dept. of Industrial Engineering, Columbia University. Consists of series of talks on various aspects of the subject, plus group discussions of a series of problems. 2-page bibliography.

6746 The Design and Analysis of Experiments. Oscar Kempthorne. 631 pages. 1952. John Wiley & Sons, New York. (QA276 K32d)

Aims to give a description of the design of experiments from as broad a view as possible and relates the subject matter of this field of statistics to the general theory of statistics and to the general problem of experimental inference.

6747 Soviet Staff Officer. Ivan Krylov. Edward Fitzgerald, translator. 298 pages. 1951. Falcon Press, London. (HC331 L94str.)

The above is an autobiography covering the period between May 1940 and May 1945. Krylov's story throws much light on the reactions of leading Russian civilians and soldiers toward the war in general and toward individuals including Stalin, Churchill, Cripps, and Roosevelt.

6748 Field Geology. Frederic H. Lahee. 853 pages. 1941. McGraw-Hill, New York. (QE28 L13f4)

Treats the subject of geology from the field standpoint. First 12 chapters are concerned with the recognition and interpretation of geologic structures and topographic forms as they are observed. Last 6 chapters describe methods of geologic surveying; the nature and construction of maps, sections, and block diagrams; interpretation of topographic and geologic maps, solution of certain geologic computations, and preparation of geologic reports. 10-page bibliography.

6749 Petroleum Geology. Kenneth K. Landes. 660 pages. 1951. John Wiley & Sons, New York. (TN870 L23p)

Covers all 3 divisions of the above: geological occurrences of oil and gas deposits, geographical distribution of oil and gas deposits, and techniques for locating oil and gas deposits. Chapter references.

6750 Records for the Control of Growing Manufacturing Enterprises. Paul F. Lawler. 131 pages. 1947. Division of Research, Graduate School of Business Administration, Harvard University, Boston. (HF5500 L42r)

Based upon information secured from visits to 37 small manufacturers during the year 1946. This study concentrated upon growing companies. An attempt was made to obtain a sample of manufacturers, not only according to variations in size, but also according to industry groups. Likewise, the sample was intended to provide a representation of both consumer goods and industrial goods manufacturers. The primary aim was to see what records were kept, why they were kept, and whether the information was sufficient for controlling the company. The exact form of the record was given less attention.

6751 Glossary of Packaging Terms. Gerry O. Manypenny, chairman. 187 pages. 1948. Packaging Institute, New York. (HF5770 P12g)

Presents standard definitions of trade terms commonly used in the packaging industry.

6752 Aerodynamics of the Airplane. Clark B. Millikan. 181 pages. 1941. John Wiley & Sons, New York. (TL570 M62a)

Emphasis is placed on fundamental fluid-mechanical principles, while material of the handbook type is to a large extent excluded. Methods of performance estimation and analysis are treated in some detail and 2 working charts included. Presented in a form suitable for students whose knowledge of engineering or physics includes only a familiarity with the elements of mechanics, and whose mathematical experience extends only to the simplest fundamentals of differentiation and integration.

6753 How to Use Your Trade Association. Walter Mitchell, Jr. 287 pages. 1951. Prentice-Hall, New York. (HD2425 M69h)

Discusses the above giving data on current trends and services offered. 7-page bibliography.

6754 The Elements of Soil Mechanics in Theory and Practice. Kevin Ll. Nash. 112 pages. 1951. Constable & Co., Ltd., London. (TA710 N17e)

Presents 4 lectures on the above. Gives a simple and concise account of aims, scope, and methods of the above science. 61 ref.

6755 I Led 3 Lives: Citizen; "Communist"; Counterspy. Herbert A. Philbrick. 323 pages. 1952. McGraw-Hill, New York. (HX84 P53i)

The fascinating story of a patriotic young American, who led a triple life for 9 years. Throughout the working day he supported his growing family at his job in advertising. Evenings and holidays he worked with the Communists, and he spent the gray hours of the morning in a secret room in his house where he typed out reports and developed photographs for the FBI.

6756* The Word Finder. J. I. Rodale, editor. 1315 pages. 1951. Rodale Press, Emmaus, Pa. (PE1421 R61W)

This book is not a thesaurus, or source of substitute words. The "Word-Finder," on the other hand, does not merely yield a substitute word but produces an augmentative word, one to embellish and add to the idea. Nouns, verbs, and adjectives are listed, alphabetically arranged, and in connection with each such word a list of "augmentatives" is given, that is, words that can be used to "condition" them.

36. *Miscellaneous*

6757 Applied Research in the United States. Eugene W. Scott, editor. 90 pages. 1952. National Academy of Sciences and National Research Council, Washington. (Q180.U5 Sco84a)

Presents a broad sketch of American practices in the organization, administration, and financing of applied research in natural sciences and engineering. Also discusses way in which new results found in the research laboratory are communicated to those responsible for their practical utilization. Directed mainly toward administrators of research in governments and industries of other countries. Needs of a nontechnical audience unfamiliar with American ways have led to simplification of the presentation. Appendix lists research and development facilities of U.S. Government departments and agencies. 45 ref.

6758* Molesworth's Handbook of Engineering Formulae and Data. Ed. 34. Albert Peter Thurston, editor. 1672 pages. 1951. E. & F. N. Spon, London. (Directory Shelf)

Covers civil and general engineering. Includes data on materials of construction and gives extensive welding information.

6759 The Story of Dixisteel; The First Fifty Years 1901 to 1951. Charles F. Stone. 177 pages. 1951. Atlantic Steel Co., Atlanta, Ga. (TS330 St72s)

Outlines the history and growth of the Atlantic Steel Co. Includes a summary of the activities in which the company is now engaged.

6760 Igneous and Metamorphic Petrology. Francis J. Turner and Jean Verhoogen. 602 pages. 1951. McGraw-Hill, New York. (QE461 T85i)

This book is intended for the use of advanced students, research workers, and teachers in the field of petrology. Its aim is to present a unified general impression of the origin and evolution of rocks that are generally believed to have crystallized, or to have been profoundly modified, at high temperatures and at pressures such as prevail from the earth's surface to a depth of 15 or 20 km.

6761 Principles of Sedimentation. W. H. Twenhofel. 673 pages. 1950. McGraw-Hill, New York. (QE581 T91p2)

Attempts to present a better understanding of sediments and sedimentary processes. Emphasis is placed on the concept that sediments are products of heritage and environments, the latter usually the more important. Chapter references.

6762 Management Behavior and Foreman Attitude; A Case Study. David N. Ulrich, Donald R. Booz, and Paul R. Lawrence. 56 pages. 1950. Division of Research, Graduate School of Business Administration, Harvard University. (HF5549 UL7m)

Gives details of case study made in a small manufacturing plant in an intensively competitive industry. Discusses the problems of communication and cooperation which existed between foremen and workers, and between foremen and management. Conclusions were that most of the difficulties were caused by failure of management to appreciate the problems of human relationship involved in the work situation.

6763 Bacterial Physiology. C. H. Werkman and P. W. Wilson, editors. 707 pages. 1951. Academic Press, New York. (QR84 W49b)

The above was written primarily for senior and graduate students in the field. Provides the reader with modern views, theories, and discussions. 71-page bibliography.

6764 A Study of Antimetabolites. D. W. Woolley. 269 pages. 1952. John Wiley & Sons, New York. (QP801.A65 W88s)

Antimetabolites are substances which produce deficiency diseases in living organisms. Surveys some of the underlying principles which govern action of the above on animals, bacteria, and other forms of life. Shows how these substances are being used as tools to discover the nature of chemical reactions associated with living processes. 500 ref.

6765 Advanced Engineering Mathematics. C. R. Wylie, Jr. 640 pages. 1951. McGraw-Hill, New York. (QA401 W97a)

Above treatments include an appendix which covers material from the borderline between calculus, advanced calculus, and theory of equations.

6766 Effects of External Beta Radiation. Raymond E. Zirkle, editor. 242 pages. 1951. McGraw-Hill, New York. (QH652 Z68e)

Presents a technical account of information collected while developing methods for producing plutonium. Some of it is related rather to technical processes that needed to be performed in preparation for making the plutonium.

6767 Chemistry—Key to Better Living. 244 pages. 1951. American Chemical Society, Washington. (QD39 Am35c) (Oversize)

Presents a series of papers by different authors in which the development of chemical science and its industrial applications over the past 75 years are reviewed. Each paper includes a discussion of the part contributed by A.C.S.

6768 Eighth International Management Congress: Stockholm, 1947. 3 Vols. 659, 316, and 746 pages. 1947, 1947, and 1948. Swedish National Committee of Scientific Management, Stockholm. (T58 In8p)

The first 2 volumes contain all papers prepared for the Sectional Meetings. The third one contains the addresses delivered at the Plenary Sessions, reports to the Sectional Meetings, and minutes of discussions at these meetings and proceedings at the opening and closing sessions. Papers are in French or English with summaries in the other language in each case.

6769 Forest Products Research Guide. Ed. 4. 335 pages. June 1950. National Lumber Manufacturers Assn., Washington. (HD9750 N21f4)

Provides ready reference to general and specific kinds of research completed or under way in organizations conducting forest-products research. Sources are indicated.

6770 The National Research Council Review. 285 pages. 1951. Council on Scientific and Industrial Research, Ottawa, Ontario, Canada. (T4 N21r)

Consists of brief introductory summary of organization and activities, detailed summaries of the activities of each division and subdivision, committee reports, administrative information, and staff directory.

6771 Proceedings 1951; Northwest Conference on Road Building. 109 pages. 1951. Engineering Experiment Station, University of Washington. (TE5 N81p)

Presents 14 papers by different authors covering various aspects of road construction.

6772 Progress in Leather Science; 1920-45. 705 pages. 1948. British Leather Manufacturers' Research Assn., London. (TS967 B77p)

Contains 34 papers by different authors covering various aspects of the above. Numerous references.

6773 Quality of Surface Waters of the United States, 1946. 486 pages. 1950. U. S. Geological Survey, Washington. (Water-Supply Paper 1050.) (QE75 Un3w)

Presents comprehensive information on the above. Includes extensive tabular data.

6774 Scientific and Learned Societies of Great Britain. Ed. 57. 227 pages. 1951. George Allen & Unwin, Ltd., London. (As8 Sc27)

Part 1 deals with the organization of scientific research in Great Britain, and gives the names and addresses of the main research establishments administered by the Department of Scientific and Industrial Research, the Medical Research Council, the Agricultural Research Council, and the research associations. A chart shows the relationships which exist between bodies engaged in scientific research in Great Britain. Part 2 gives full details of more than 600 societies in Great Britain, including objects and publications of the society concerned, membership subscriptions, meeting times, and principal officers. The societies are listed alphabetically, and are classified.

6775 Symposium on Titanium. 106 pages. 1950. Research and Development Board, Dept. of Defense, Washington. (TN799.T5 Un3s)

Talks, papers, and discussions presented Nov. 8-9, 1950. Includes "The Trends of the Electric Power Industry in the

United States and Their Relation to Titanium Production," by J. W. Swaren. Other participants included B. S. Mseick, Leonard Jaffee, H. J. Boertzel, W. Lee Williams, Oscar Marzke, J. J. Harwood, Richard R. Kennedy, H. K. Adenstedt, A. B. Kinzel, E. I. Larsen, and V. W. Whitmer.

6776 Tables of the Bessel Functions of the First Kind of Orders Seventy-Nine Through One Hundred Thirty-Five. 614 pages. 1951. Harvard University Press, Cambridge, Mass. (QA408 H26t)

Prepared by the staff of the Computation Laboratory.

6777 Textiles and Their Testing. 86 pages. 1949. His Majesty's Stationery Office, London. (Selected Government Research Reports, v. 4.) (TS1449 G79t)

Discusses and presents results of tests on durability of fabric. Includes metal-plated fabric and nylon. Discusses fireproofing, rotproofing, and microbiological degradation.

6778 Turbidity Currents and the Transportation of Coarse Sediments to Deep Water. 107 pages. 1951. Society of Economic Paleontologists and Mineralogists, Tulsa, Okla. (Special Publication No. 2.) (GC11 So68t)

Presents 6 papers by various authors on the geological concepts involved in explaining the occurrence of layers of coarse sediment in the deep oceans.

6779 United States Tariff Commission Rules for Tabular Presentation. Unpaged. 1951. U. S. Tariff Commission, Washington. (HA31 Un3r)

Presents a guide for the staff of above organization in preparation of statistical material.

See also:

5125 (Treating of Steel—book)
5605 (Be toxicology—analytical procedure)
5794 (radioactive indicators in medicine and biology)
5818 (Stainless Steels in Industry—book)
5819 (Al in chemical and food industries)
6100 (Encylopedia of Chem. Tech.—Vol. 8)
6453 (Phosphorus Metabolism—book)
6571 (application of atomic energy)